Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

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Vol. 10 No. 7 *July 1957*

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Washington D.C.

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FRED A. SEATON, Secretary

FISH AND WILDLIFE SERVICE
JOHN L. FARLEY, Director

Commercial Fisheries Abstracts

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In addition to the regular abstracts, there is included a bibliography of references of secondary importance (without abstracts). These may be cut off on the lines designated and pasted on standard 3 x 5-inch cards for filing.

Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

0	General and theoretical	5	Vitamins
1	Fish by species	6	Fishery byproducts
2	Fresh fish	7	Analytical Methods
3	Preserved fish	8	Composition
4	Oils	9	Miscellaneous

Use of funds for printing this publication has been approved by the Director of the Bureau of the Budget November 23, 1956.

0.35 BIOCHEMISTRY OF FISH

Anonymous
Report of the Food Investigation Board (Great Britain) for 1954, pp. 45-49 (1955)

The two most important muscle texture proteins, myosin and actin, have been isolated from the muscle fibril of codling muscle; and their properties have been described. The so called "peroxide" isolated from partially oxidized methyl linoleate was reduced and found to consist of two components. One of these components, a hydroxy linoleic ester, is labile and can lose water. With moderate heating the linoleic ester passes into a conjugated linolenic ester. These three components make the identification of the structure of the reduced peroxide impossible, however methods have been worked out for the separation of this mixture into its components. The free amino acid composition of codling muscle as determined during 1953 and 1954 shows considerable seasonal variation particularly in taurine and lysine. This variation may derive from the effects of gonad maturation and concomitant spawning anorexia. An investigation of the spoilage changes under standard icing conditions has demonstrated a multiplicity of trends. The free sugar in fresh codling muscle is glucose. Over a period of storage in ice, glucose diminishes and free ribose appears from the autolytic cleavage of ribosides. Browning in freeze-dried muscle extractives at 32° F. and 77° F. was at a maximum at relative humidities lower than those reported for casein-glucose mixtures. The reaction was dependent upon high temperature and was at a maximum at pH 7.

One type of mucous cell, found in the epidermis of all fish, produces a characteristic slimy secretion that appears to be a neutral or slightly acid mucopolysaccharide. These mucous cells are not structurally similar in all fish. The active metabolite of a marine chromobacterium, which has strong antibiotic activity against certain Micrococci, has been isolated; and an investigation of the structure of this compound is in progress. Fine calorimetry measurements have proved that chopped haddock

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 ABSTRACTER: Martin Heerdt

0.5 THE EFFECTS OF FREEZING ON MARINE BACTERIA
I. QUANTITATIVE STUDIES

Hess, Ernest (Atlantic Fisheries Experimental Station, Halifax, Nova Scotia)
Journal of the Biological Board of Canada 1, 95-108 (October-December 1934)

According to Hilliard, Torissian, and Stone (1915) the factors that influence the effect of freezing temperatures on bacteria are (1) the species or strain of bacteria, (2) the history and treatment of the bacteria prior to freezing, (3) the physical and chemical composition of the medium in which the bacteria are frozen, (4) the temperature of the freezing mixture, (5) the duration of freezing, (6) the abruptness of temperature change, and (7) the cultivation of the organisms subsequent to freezing.

Objective. -- This study was made to learn the effect of some of the above mentioned factors on the freezing of marine bacteria.

Experimental. -- Strains of Pseudomonas fluorescens, Flavobacterium deciduosum, and Achromobacter, isolated from codfish slime, were the marine bacteria used in this study. Uniform suspensions of 8 cc. each of the test cultures were inoculated into sterile media, one culture to a tube, and thoroughly mixed. Samples consisting of 1 cc. each were withdrawn from each tube, plated in appropriate dilutions in nutrient agar, incubated at 20° C. for 6 days, and counted. Suspensions of the test cultures in tubes were then immersed in circulating brine at -16° C. for definite periods of time after which they were allowed to thaw immediately in a large bath of water held at 16° to 18° C. After the tubes had been shaken and mixed thoroughly, they were sampled and plated as before.

Results. -- An increase in the destruction of bacteria was caused (1) by lowering the freezing temperature, (2) by increasing the length of exposure to freezing temperature, (3) by repeated

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 ABSTRACTER: Martin Heerdt

0.5 EFFECT OF FREEZING ON COLIFORM BACTERIA AND METHOD OF DETECTION IN FROZEN FISH FILLETS AND BLOCKS

Dussault, H. P. (Technological Station, Grand-Riviere, Que.)
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 65, 12-16 (October 1956)

The presence of coliform bacteria in fish products indicates unsanitary practices and conditions within the plant.

Objective. -- The following study is concerned with (1) the effect of freezing on coliform bacteria and (2) a method for their detection in frozen fish fillets.

Effect of freezing. --Samples of frozen fillets of haddock, flounder, and cod in small packages and in large blocks were collected from various plants. These samples had been quick frozen in plate freezers and held frozen for 2 to 8 weeks. The samples were partially thawed, and tested for the presence of coliform bacteria in the laboratory. Several of the samples yielded coliform bacteria that had obviously resisted quick freezing and cold storage.

To test the resistance of coliform bacteria, five typical cultures of these bacteria were isolated from frozen fish, inoculated into tubes of culture media, incubated until heavy growth developed, and stored at 32° F. Cultures were removed after 2 and 7 days, plated onto solid medium, and incubated until growth developed. All five of these cultures survived relatively long exposures to slow freezing.

In another experiment each of five typical coliform cultures was inoculated by the cross-streak method onto the surface of freshly prepared plates of culture medium and the plates were stored in a

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 ABSTRACTER: Martin Heerdt

1.01 YEARBOOK OF FISHERY STATISTICS, INTERNATIONAL TRADE

Anonymous
Yearbook of Fishery Statistics 1952-53 (FAO) 4, Part 2, 328 pp. (August 31, 1955) (Rome, Italy)

Brief outline of contents. --Section 1 contains three summaries showing world trade in fishery products by continent and commodity.

Twelve summary tables are presented in Section 2: one for each of the commodity groups. These show country totals and continental and world aggregates of quantities and values.

The five tables appearing in Section 3 present imports and exports of certain fishery products which, although included in the tables of Section 2 as components of the respective commodity groups, are shown individually because of their relative international significance.

The last six Sections, 4-9 (one for each continent), present, for each of the 110 customs territories, listed in the English alphabetical order, a table showing the imports and exports of fishery products. These country tables give the quantities and values for the detailed items appearing in the national publications. These items, broken down for the quantities by country of origin (or provenance) and destination, are arranged by "commodity groups" designed by FAO and keyed closely to the SITC system. (See Classification of Fishery Commodities, p. 295.)

 Reprinted in part

BIOCHEMISTRY OF FISH

ASSAY FOR COLIFORM BACTERIA

FREEZING OF MARINE BACTERIA

INTERNATIONAL TRADE 1952-53

0.5 (Cross Reference: 2.05)

deep-freeze unit at -4° F. for 36 hours and then incubated at 99° F. Growth occurred only where the heavy bacterial suspension had been deposited originally and not in the area where cross streaking had reduced the number of bacteria. Control plates that had been similarly inoculated but not frozen showed colonies all along the streaks. These results show that coliform bacteria are not eliminated by rapid freezing or storage at low temperatures, although an appreciable degree of reduction can be obtained if the initial concentration is not too heavy.

Coliforms in frozen fillets. -- For the purpose of comparison, two methods of testing for coliforms were tried.

With method 1, the contact plate method, 1-inch squares of surface sections cut from the frozen fish fillet blocks were placed onto the surface of eosin methylene-blue agar plates for about 30 seconds, then removed and the plates incubated at 99° F. The appearance of characteristic colonies on the plates and gas production after transfer of the bacteria into confirmatory media indicated the presence of coliform bacteria.

With method 2, the swab method, the underside of the same block sample used to obtain 1-inch squares was swabbed with a sterile applicator. The applicator swab was then placed into a tube of lactose broth, and the tubes were incubated. Gas in the tube and other specific tests confirmed the presence of coliform bacteria.

A comparison of the results showed that the swab method gave more reliable values than the contact method, probably because the swab method covers a larger surface area of the fish than the contact-plate method. The swab method also offers a better chance for obtaining positive results, but it does not indicate the extent of the contamination.

1.01 (Cross Reference: 9.2)

0.35

muscle, packed in melting ice, appears to generate between 1 and 3 calories per gram of fish per 24 hours. If this represents practical conditions, the amount of heat generated would in the case of an average trawler load of about 100 tons of fish, account for the melting of about 25 tons out of the normally used 80 to 100 tons of ice per trip.

0.5

exposure to freezing, and (4) by rapid freezing. A greater percentage reduction was observed in super-cooled sea water than was observed at the same temperature in frozen sea water. Bacteria frozen in distilled water became transferred from the crystallizing portion of the water to the unfrozen portion of the water.

In broth media that were very favorable for the growth of bacteria, the destruction of bacteria by freezing was less severe than in other media. Bacteria frozen in filtered sterile sea water received a degree of protection that was not afforded by distilled water or broth media, although growth conditions were less favorable in sea water than in broth. Bacteria cells from old cultures appeared less sensitive to freezing than did bacteria cells from young cultures, and bacteria grown previously at -3° C. appeared to be more resistant than bacteria grown previously at 5° C. and 20° C. The species of Achromobacter used in this study had the ability to ferment glucose. This ability produced a strain that--after it had been cultivated in 1 percent glucose broth--was more resistant to freezing. In contrast, Flavobacterium deciduosum, which does not ferment glucose, became more sensitive to freezing after it had been cultivated in 1 percent glucose broth.

Table 10. Effect of freezing in distilled water, sea water and nutrient broth of different concentrations of NaCl on reduction of Pseudomonas fluorescens

Medium	Initial no.	No. after exposure to -16° C. for			No. in control after 24 hours at 20° C.
		10 min.	24 hours	7 days	
Dist. water	64,000,000	2,252,000	2,211,600	. . . .	29,484,000
Sea water	64,000,000	37,917,500	9,286,500	29,200	216,050,000
0% NaCl broth	64,000,000	1,491,000	254,800	22,270	551,000,000
2% " "	64,000,000	543,750	6,160	140	672,100,000
5% " "	64,000,000	202,500	13,460	108	660,000,000

1.01 YEARBOOK OF FISHERY STATISTICS 1954-55, PRODUCTION AND FISHING CRAFT

Anonymous
FAO Yearbook of Fishery Statistics 5, Part 1, 249 pp. (1956) (Rome, Italy)

The latest edition of the FAO Yearbook includes 72 tables of statistics from more than 150 countries and territories; and, for the first time, important summary data are shown in diagrammatic form. Detailed tables give data from 73 selected countries which land about 75 percent of the world catch.

The Yearbook is arranged in eight sections, A to H. The first four sections give details of catch and landings. Section E gives disposition of the catch, whereas section F shows production of preserved and processed commodities. Sections G and H give information, respectively, about fishing craft and the whale catch. Valuable background and explanatory information is to be found in the notes and glossaries which contain English, French, and scientific names of fish.

The Yearbook has been enlarged and contains more detailed information than was found in previous issues. The text throughout is printed in English and French, with the Introduction, Notes and Section titles also given in Spanish.

Five new tables of statistics appear in this edition of the Yearbook. The first, table A-5, shows the world catch and landings by countries with comparable figures for the various regions. Table B-2, which gives catch and landings in quantities by groups of species and by countries, is also a new table. (The continental totals have been summarized in table B-1). Table F-1, a summary of production of preserved and processed commodities in selected countries, is another new table, as are tables H-1 and 2, which provide statistics of the catch of whales by whaling areas and by countries and whaling areas.

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 ABSTRACTER: Martin Heerdt

2.1121 A NEW MID-WATER TRAWL FOR HERRING

Barraclough, W. E. and Johnson, W. W. (Fisheries Research Board of Canada Biological Station, Nanaimo, B. C., Canada)
Bulletin No. 104 (Ottawa) (1956)

Plans and details of construction and operation are given for a one-boat two-warp mid-water trawl designed for fishing herring at depths up to 50 fathoms, by boats of 150-175 h.p. It is built of nylon netting to obtain maximum towing speed, the smallest size used being $1\frac{1}{4}$ inches stretched measure, in the cod end. The net is spread by specially designed curved dual-fin otter boards, attached at the ends of "pennants" 10 fathoms long. The lower edge is held down by depressors, and the upper edge is elevated by means of planing floats. Cost of materials and fittings for the net, including netting, twine, lines, floats, otter boards and depressors, was about $1,500. (This does not include the regular towing warps.) Labour costs are additional.

Preliminary herring-fishing tests with the net show that it is most effective during the early part of the night and just before daybreak. It took catches of 20 to 30 tons in hauls of 15 to 20 minutes each, at depths of 15 to 35 fathoms. These herring schools were located by echo-sounder, and were 5 to 10 fathoms "thick". Much smaller catches were taken during the later part of the night, in the upper 15 fathoms of water, and also during the day when the herring were near bottom. However, a few large daylight catches were obtained. The trawl is designed to take up to 50 or 60 tons of fish, but with careful handling quantities up to 100 tons might be landed successfully.

See illustration, over.

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 Authors' summary

2.03 BLACK SPOT ON PRAWNS

Anonymous
Food Manufacture 32, 175 (April 1, 1957)

Black discoloration of prawns occurs on the shell at the abdominal joints and on the flesh under the shell where the segments join. It also may occur in the head of the prawn. The discoloration usually is initiated during storage aboard the shrimp trawler. It does not actually become apparent until later when the fresh shrimp are offered for sale in retail stores or are frozen and placed in storage.

Formation of the black melanin pigment responsible for the discoloration usually depends upon the availability of a suitable substrate. This substrate usually is tyrosine or hydroxyphenylalanine in combination with molecular oxygen and the enzyme tyrosinase. Unless all of these three chemicals are present black spot formation is hindered. Prawns stored in ice that contains 0.25 percent sodium bisulphite or sulfite have been protected almost entirely from black spot formation for as long as 14 days. Ice containing 0.25 percent sodium chloride was not as effective in retarding spot formation as was the sulfite ice.

Sulfite ice also has the advantage of holding the prawns at a slightly lower temperature than water ice. The lower temperature inhibits the growth of bacteria and increases the storage life of the prawns. In addition, prawns retain their natural color and are protected against the development of off odors for a longer period of time in sulfite ice.

In some instances, sections of the prawns which come in contact with sulfite ice may be bleached. These bleached areas become brown in color when the prawns are cooked and slightly tougher in

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 ABSTRACTER: Martin Heerdt

2.4 FRESH FISH HANDLING (FISH AND FISH PRODUCTS DIVISION)

Anonymous
Report of the Food Investigation Board (Great Britain) for 1954, pp. 33-36 (1955)

Sensory assessment of quality. -- Taste panel results clearly indicate a significant alteration in the quality of frozen fish during cold storage. The amount of alteration depends upon the degree of freshness of the fish before it was frozen.

Objective assessment of quality. -- Test papers impregnated with a colorless tetrazolium salt were used to measure various stages of spoilage of fish in ice. The depth of color that resulted in the papers within a fixed time after they were laid on the wet fish was measured against standard papers. In some instances paper color was eluted and estimated colorimetrically. Color tests were compared with organoleptic tests for quality. Cod and haddock not more than one week in ice produced no color, whereas fish that had become very stale to putrid in ice quickly changed the test papers to a deep purple-red color.

Effect of ambient temperature on spoilage. -- Within normal limits, the higher the ambient temperature the better is the keeping characteristics of well iced fish stored in wooden or metal boxes. The favorable effect of a high ambient temperature appears to be due to the increase in the rate of melting of the ice, and to the resulting increase in the washing and leaching of the fish. These results were confirmed organoleptically by a taste panel, by bacteria counts, and by measurement of total volatile bases.

Effect of washed fish and clean boxes. -- The keeping quality of washed haddock and codling stored in boxes with adequate ice showed little or no improvement over the keeping quality of unwashed fish

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 ABSTRACTER: Martin Heerdt

2.03 (Cross Reference: 1.85, 3.12)

texture than the other parts of the prawn. Weaker solutions of sulfite may give equally good results in the prevention of black spots. Prawns treated in this way, if thoroughly washed at the fish plant, may be rendered free of sulfite.

To retain their fresh quality, prawns should be thoroughly washed and iced within two hours after being brought aboard the trawler. Under similar conditions headless prawns will keep for a longer period of time than whole prawns.

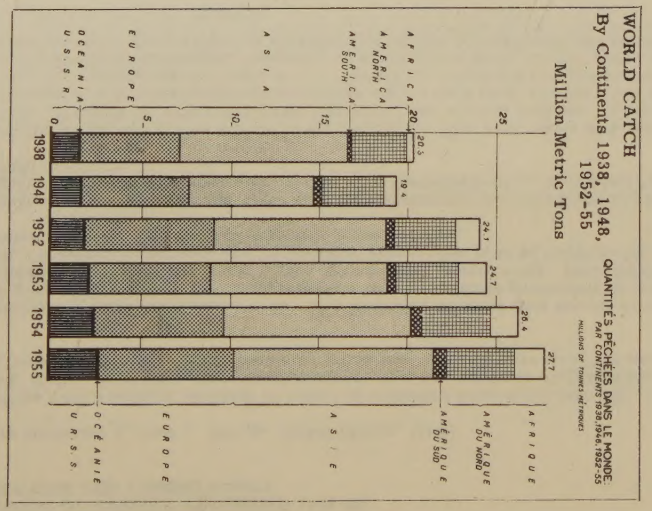
2.4 (Cross Reference: 7.89)

similarly stored. Washing as it is normally performed on board the boat appears to have very little effect on subsequent quality. The skin of washed fish was found to have a larger bacterial load immediately after washing than the skin of unwashed fish. Fish boxes that had been washed with water under pressure looked clean, but they still retained one-half of their original bacterial contamination. Steaming the boxes, in contrast, caused a thousand-fold reduction in bacterial contamination. Chemical detergents and sanitizers varied greatly in their effectiveness on contaminated boxes. Results also suggest that if fish are surrounded with plenty of ice the cleanliness of the box does not have a significant effect on the fish.

Preservative ices. -- Crushed ice containing 3 to 7 parts per million (p. p. m.) of aureomycin, when used for icing fish, prolonged the edible quality of the fish, as judged organoleptically, chemically, and bacteriologically, by 7 to 10 days longer than that of the control fish stored in ordinary crushed ice. The skin of fish held in aureomycin ice had up to 6 p. p. m. of aureomycin, but the flesh had almost none. Cooking the flesh by steaming in a casserole resulted in a fish juice that contained 0.1 p. p. m. of aureomycin. Permission for the commercial use of aureomycin ice has not been considered or approved.

Packaging. -- The organoleptic quality of fish fillets was unaffected by cellulose acetate or polyethylene films as fillet wraps. Trimethylamine and total volatile base was slightly higher in wrapped fillets than in unwrapped fillets.

1.01 (Cross Reference: 9.2)



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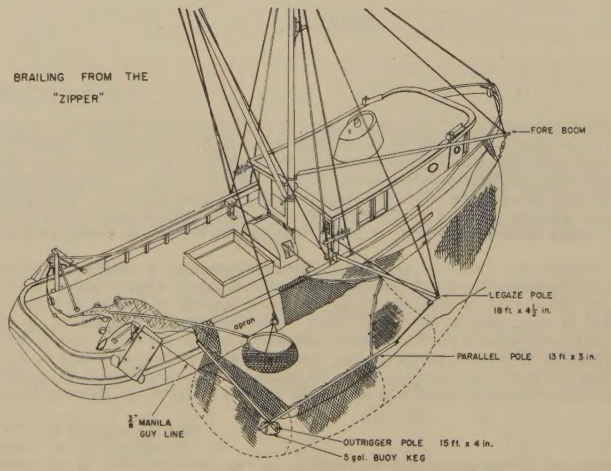
BRAILING FROM THE "ZIPPER"
FORE BOOM
LEGAZE POLE 18 ft. x 4½ in.
PARALLEL POLE 13 ft. x 3 in.
apron
⅜" MANILA GUY LINE
OUTRIGGER POLE 15 ft. x 4 in.
5 gal. BUOY KEG

Fig. 25. --Mid-water trawl in position for brailing.

2.12 SHRIMP EXPLORATIONS OFF THE WASHINGTON COAST, FALL 1955 AND SPRING 1956

Schaefers, Edward A. and Johnson, Harold C. (Exploratory Fishing and Gear Development Section, Fish and Wildlife Service, Seattle, Washington)
Commercial Fisheries Review 19, 9-25 (January 1957)

Shrimp explorations off the Washington coast were conducted by the Service's exploratory fishing vessel John N. Cobb during the fall (October 18 to November 9) of 1955 and spring (March 27 to April 19) of 1956. These explorations were carried out in cooperation with the State of Washington Department of Fisheries' shellfish division. Gear used during the fall exploration included a 20-foot beam trawl and a small West Coast box-type otter trawl. Gear used during the spring exploration included a 20-foot beam trawl, a small West Coast box-type otter trawl, and a 40-foot Gulf of Mexico shrimp trawl.

Fishing results during the fall exploration showed that pink shrimp (Pandalus jordani) were widely distributed at various depths over the entire area explored. The best drag with the beam trawl caught 150 pounds of heads on shrimp an hour and the best drag with the otter trawl caught 600 pounds of shrimp an hour.

Fishing results during the spring explorations showed that of the three types of gear used, the Gulf shrimp trawl was the most efficient and practicable type of gear for catching shrimp on these grounds. Of the 51 drags made with this gear, 25 caught shrimp in amounts ranging from 300 to 2,200 pounds an hour. The two most promising localities which appeared to offer the best prospects for the development of a commercial shrimp fishery are between the mouth of the Moclips River and the mouth of Connor Creek, and between Grays Harbor and Cape Shoalwater.

Authors' summary

3.12 POTENTIAL APPLICATION OF ANTIBIOTICS IN THE SALMON CANNING INDUSTRY

Stern, Joseph A.; Liebman, Harmon L.; Munkelt, Robert E.; and Hatherell, Byron (School of Fisheries, University of Washington, Seattle)
Antibiotics Annual 1956-57, pp. 975-983 (1957) Medical Encyclopedia, Inc., New York, N. Y.)
Pacific Fisherman 54, 13, 15, 17, 18 (November 1956)

A major problem facing canners of salmon, especially in Alaska, is the storage of fresh fish prior to canning. By the time the fish are received at the cannery they may have been held in the round for some time (2 to 36 hours) without being iced. In the canneries the fish are stored in large wooden bins at temperatures ranging from 60° to 80° F. Some canneries use refrigeration, but this solution is not always feasible. The cost of machinery, the cost of transportation of machinery and fuel, and the cost of power prohibit the large scale use of refrigeration in certain areas.

Recent work has demonstrated the preservative effects of the tetracycline-groups of antibiotics on fish and other protein foods. A series of experiments was designed to test the effectiveness of various concentrations of oxytetracycline in extending the storage life of sockeye salmon.

Experimental procedure. -- There are three places in the sockeye salmon production line where the antibiotic could be applied. These are (1) aboard the fishing vessel, (2) aboard the tenders, and (3) at the cannery. The first possibility was discarded due to the cramped and difficult conditions commonly encountered aboard the fishing vessels employed in this fishery. Thus, the first possible point of application of the antibiotics is aboard the tenders. Even here difficulties might be encountered due to the vagaries of wind, weather, and wave. The most convenient point of application would be when the fish are first received at a shore installation. In the experiments, round fish were stored in (1) refrigerated brine, (2) at air temperatures, and (3) in ice.

The refrigerated brine experiments were carried out using three different temperatures of

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ABSTRACTER: Kathryn L. Osterhaug

2.9 THE NUTRITIVE VALUE OF MARINE PRODUCTS XVII. VALUE OF B-VITAMINS IN FISH FLESH FOR GROWTH OF YOUNG RATS

Beveridge, J. M. R. (Pacific Fisheries Experimental Station, Vancouver, B. C., Canada)
Journal of the Fisheries Research Board of Canada 7, 74-87 (May 1947)

A study was made to determine the relative values of the flesh of lingcod, lemon sole, halibut, white spring salmon, beef, and pork as sources of the B-vitamins. All were fed to growing rats at the 20 percent level.

Experimental procedure. -- The fish were prepared as fillets or steaks, cooked one hour in a steam autoclave at 99° to 100° C., pressed, minced and partially dehydrated for about 2 hours at 40° C. in a warm air tunnel. The fat was removed from the cooking liquor and the liquor evaporated to a thick syrup under vacuum on a water bath at 40° to 50° C. The concentrate was added to the partially dried fish flesh and the mixture dried at 32° C. to a moisture content of approximately 6 percent. Light and heat were carefully controlled to afford maximum protection of the B-vitamins. Pork and beef flesh used for comparison studies were treated in the same manner after all visible fat and connective tissue had been discarded.

Moisture and fat determinations were made on each sample. The diets were made up on the basis of these figures to contain the same amount of moisture-free material and to have the same caloric content. The basal diet contained casein (fat and vitamin-free) 20 percent, sucrose 62 percent, beef dripping 6 percent, Mazola oil 4 percent, salts 5 percent, agar (in first feeding trial only) 2 percent, celluflour (in second feeding trial only) 2 percent, cod liver oil (1800 I. U. vitamin A/gram and 175 I. U. vitamin D/gram) 1 percent. Vitamin supplements for control diet A consisted of 5 percent yeast and 1 percent Lilly's liver concentrate. These materials replaced an equivalent amount of sucrose. Control diet B contained 0.3 percent choline chloride and 1 percent of a mixture of powdered sugar and crystalline vitamins made up so that each gram contained 500γ thiamine hydrochloride, 400γ riboflavin, 200γ pyridoxine hydrochloride, 1000γ calcium pantothenate, and 1000γ nicotinamide,

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ABSTRACTER: Kathryn L. Osterhaug

3.12 ADVANCES IN FOOD TECHNOLOGY MADE POSSIBLE THROUGH THE USE OF ANTIBIOTICS

Wrenshall, C. L. (Chas. Pfizer & Co., Inc., Brooklyn, N. Y.)
Antibiotics Annual 1956-57, pp. 809-815 (1957) Medical Encyclopedia, Inc., New York, N. Y.)

Since the discovery of antibiotics, food technologists have contemplated their use to delay food spoilage. Early efforts were disappointing because of the limited bacterial spectrums of the first antibiotics. With the broad-spectrum antibiotics, however, results were obtained that opened up new possibilities.

Broad-spectrum antibiotics, particularly those in the tetracycline group, have shown promise in the category of delaying the bacterial spoilage of perishable foodstuffs. In general, perishable foodstuffs readily support the growth of a variety of bacteria and, under natural conditions, have extremely short shelf life. The fresh life of a perishable food is the interval of time that elapses before the bacterial count goes into a steep climb.

In general, there are two ways in which the fresh life can be increased: (1) by decreasing the initial population of bacteria that are capable of proliferation, and (2) by slowing down the average rate of growth.

Antibiotics are believed to act in both ways. In the presence of an effective concentration of a broad-spectrum antibiotic, only a few of the bacteria present are able to grow, and these at reduced rates. It is significant that antibiotics and refrigeration supplement one another in slowing the growth of bacteria.

Good sanitation is also extremely important in order to reduce the initial number of bacteria

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ABSTRACTER: Kathryn L. Osterhaug

PACIFIC SHRIMP EXPLORATIONS

B-VITAMINS IN FISH

ANTIBIOTICS FOR SALMON

PRESERVATION WITH ANTIBIOTICS

2.9 (Cross Reference: 5.4)

The test rats were first placed on a depletion diet to rid them of any stored B-vitamins and then placed on the test diets, five animals to each diet. The flesh preparations were incorporated into the diet at 20 and 8 percent levels in place of similar amounts of sucrose. The diets were fed ad libitum for 28 and 42 days respectively.

Results. -- Pork flesh permitted a maximal rate of growth. The other types of flesh evoked subnormal growth responses and are placed in decreasing order of adequacy for growth with respect to the B-vitamins: beef, white spring salmon, and halibut. The feeding of lemon sole and lingcod brought about weight losses.

The principal deficiencies in the different fleshes as determined by the effects of the injection of various combinations of vitamins as indicated in decreasing order of magnitude are: beef–thiamine, riboflavin; salmon–riboflavin, thiamine; halibut–riboflavin and pantothenic acid, thiamine; lemon sole and lingcod–thiamine, riboflavin and pantothenic acid.

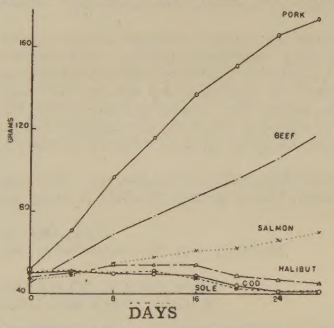

Figure 1. Average growth curves of males on diets in which the B-vitamins were supplied by different flesh preparations at a dietary level of 20%.

2.12 (Cross Reference: 1.85)

3.12

present. To get the maximum effect from antibiotics, good sanitation must be practiced and the antibiotic must be added before bacterial numbers have had an opportunity to build up.

It is of interest to note that the effectiveness of a broad-spectrum antibiotic is not achieved by its action against a single species of bacteria, but by its over-all effectiveness against all species present. Oxytetracycline, which is active against a wide variety of bacteria, has proved to be effective in extending the fresh life of naturally contaminated perishable foodstuffs.

The application of antibiotics in food processing is very simple and can be adapted to almost any existing process. Oxytetracycline, for example, is water soluble and diffusible and may be applied to foods in water solution. For treating poultry, the antibiotic is added to the chill tanks. Fish may be dipped or sprayed with the antibiotic solution, stored in refrigerated brine containing the antibiotic, or iced with antibiotic ice. Antibiotics may be injected into animals prior to slaughter or infused into carcasses on the killing floor. Fruits and vegetables may be sprayed with antibiotic-containing solutions, or they may be dipped, soaked, or rinsed in water solutions of antibiotic.

The amount of antibiotic required to effect a significant extension of fresh life is very small. Concentrations as low as 1 ppm or less in the food are often remarkably effective. By present indications, the cost of antibiotic treatment will be in the range of 1 mill to 1 cent per pound of food treated.

With respect to residues, the behavior of oxytetracycline is almost ideal. Not only are effective levels low initially, but oxytetracycline is relatively unstable, especially at cooking temperatures. Residues in food, as eaten, are generally 0.1 ppm or less.

Antibiotics have not been approved by the Food and Drug Administration for use on fishery products in the United States.

3.12 (Cross Reference: 3.333)

storage, 32°, 40°, and 50° F. Two large wooden tanks were constructed, each 6 feet in diameter and 5 feet in depth. Each tank was equipped with its own refrigeration, circulatory and control systems. Five 55-gallon steel drums, each coated internally with a microcrystalline wax, were placed in each tank. A large bag of polyethylene laminated to cellophane was placed in each drum and half filled with sea water shortly before the fish were added.

The following concentrations of antibiotic were used at each temperature of brine: 0, 5, 10, and 20 ppm of oxytetracycline (OTC) and 5 ppm chlortetracycline (CTC) at 32° F.; 0, 5, 10, and 20 ppm OTC and 10 ppm CTC at 40° F.; and 0, 5, 10, and 20 ppm OTC and 20 ppm CTC at 50° F.

In the second experiment a sea water solution containing 20 ppm of oxytetracycline was used as a spray and the control was sprayed with sea water. A second spraying of the antibiotic solution was given to part of the fish the day following the original spraying.

The third experiment--that of iced storage of salmon--was carried out using fish delivered to the cannery by tender. The salmon were stored in ordinary flake ice and in flake ice containing 5 ppm oxytetracycline.

At intervals, samples were removed, graded organoleptically, cut and filled into half-pound flat cans and processed in the standard cannery manner. Samples were also taken for chemical and bacteriological examination.

Two weeks after the last sample of salmon had been canned an organoleptic examination was conducted on representative cans of all the experimental packs.

Results and discussion. --The preservative effects of the antibiotics were evaluated both on the raw fish and on the canned product. The correlation between the two judgings was good when the fish were very fresh or very poor but, when the fish entered the state of incipient spoilage, judgment of the raw quality became difficult and the correlation between judgings was poor.

The conclusions stated here are based on the organoleptic judgments of the canned salmon. In these experiments the final conclusions were that the antibiotics extended the over-all storage life of the salmon and also, for a short time, extended the period when the salmon were judged as good. The maximum extension of storage life occurred in the 32° F. brine storage experiment. Here the antibiotics increased by three days the time of storage during which the fish were rated good, and the over-all storage life by nine days.

2.3 HANDLING AND PREPARATION OF FISHERY PRODUCTS
FILLETING MACHINES

Borg, F.
Norsk Fryserinaering 8, No. 2, 1 (January 1956) (Oslo, Norway)
World Fisheries Abstracts 8, 21-22 (January-February 1957)

A filleting machine should satisfy the following requirements of the fish industry: the yield of fillets should be at least the same as that which is achieved by hand-filleting, regardless of the consistency of the fish; the machine should be easy to operate; the design of the machine should be so simple and so robust that overhauling and eventual repairs can be made by people without high technical knowledge; the machine should give a good return within a reasonable time; the amount of fillets with bones or remnants of the skin which have to be removed later (trimming of the fillets) should be as small as possible; and the sorting of the fish according to size before the processing should be unnecessary.

The new filleting machine, made by a Copenhagen, Denmark, manufacturer, is claimed to satisfy all these requirements. The uield of fillets is said to be 2 to 5% higher than by hand filleting, and the capacity of the equipment 12 to 20 fish/min. The trimming of the machine-cut fillets is confined to removing skin and blood remainders or small bones. A fish of 0.5 kg. (1.1 lb.) can be cut immediately after a fish of 3.5 kg. (7.7 lb.) with the same good result. It should also be possible to use the machine for other species with a body construction similar to that of the cod.

The new machine shows no resemblance to any earlier known filleting machine. In the old machines the fish are usually dragged through it by means of a claw which grasps its tail. In the new machine, however, the fish are pushed through by a special device. When the first machine was built

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 ABSTRACTER: Rolv Vesterhus

3.237 SOME FACTORS AFFECTING "SAWDUST" LOSSES DURING THE CUTTING OF FISH STICKS

Cocca, F. J. (United States Fish and Wildlife Service, East Boston 28, Massachusetts)
Commercial Fisheries Review 19, 1-6 (February 1957)

Fish sticks are cut from frozen blocks of boneless and skinless fillets in a three-step operation that results in the loss of from 7 to 12 percent of the weight of the block as "sawdust". This represents a considerable loss to the industry. Based only on the 1955 total of 48.2 million pounds of imported frozen fish blocks, and assuming an average sawdust loss of 10 percent, this loss would amount to 4.8 million pounds of fish fillets.

Fish sticks are cut from frozen fish-fillet blocks by two methods: (1) by the use of a group of bandsaws and (2) by the use of a combination of bandsaws and of guillotine cutting knives. The bandsaw blades that are used vary considerably in type and size.

Because observations indicated that the characteristics of the bandsaw blade affect the amount of sawdust lost, a series of tests was carried out to determine the effect of the type of blade on sawdust production. The following variables were studied: (1) width of blade, (2) number of teeth per inch, (3) degree and type of set, (4) gauge (thickness), and (5) degree of set.

Effect of width. -- The effect of width of the blade was studied using four blades identical in every respect except width. The widths studied were 1/4, 3/8, 1/2, and 5/8 inch. Within this range, the wider the blade the greater was the sawdust loss. A practical limit is placed on the possible decrease of width because a blade that is too narrow reduces the efficiency of the cutting operation and also bends under pressure causing the cuts to become less uniform.

Effect of number of teeth. -- An increase in the number of teeth per inch of blade (from 3 to 6 teeth) progressively reduced the loss of sawdust from 8.86 percent to 6.94 percent. However, increases in the number of teeth resulted in increased clogging of the blade.

Effect of degree and type of set. --The effect of the degree of set was studied by the use of three

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 ABSTRACTER: Kathryn L. Osterhaug

3.234 FACTORS THAT AFFECT FREEZING (FREEZING AND COLD STORAGE)

Anonymous
Report of the Food Investigation Board (Great Britain) for 1954, pp. 36-40 (1955)

Physical factors affecting the freezing process. -- An inorganic salt solution (80 percent by weight) in which is suspended a protein (20 percent by weight) was found to have characteristics representative of white fish muscle from a thermodynamic standpoint. Sodium chloride solution, 0.28 molar, gave the required depression (1.8° F.) of the initial freezing point. By using the sodium chloride freezing point depression curve, the experimenter calculated the initial molarity of the theoretical muscle solution and its proportion by weight. The proportion of pure ice to the remaining more concentrated solution was calculated and their volumes were measured at a number of temperatures in the cooling and freezing range of 60° to -30° F. The thermal conductivity of this theoretical muscle solution was derived from the foregoing data by the application of a formula derived by Maxwell and used by Eucher (1940). Thermal conductivity of cod muscle down to -20° F. also was determined experimentally and found to agree with a theoretically derived curve. The same muscle solution was used to determine by theoretical methods the density and apparent specific heat of white fish muscle.

When air-blast freezing data obtained in 1953 with small commercial-size trays of fillets was studied for the effect of air speed, temperature of the air, and thickness of the package on the time of thermal arrest, the experimenter obtained results that were immediately applicable to industry. Experiments with a 6-inch slab of fish showed a 50 percent reduction in thermal arrest time with the elevation of the initial temperature from 32° F. to 50° F. Under these conditions the ratio of thermal arrest time to overall freezing time from loading to a temperature of -6° F. at the center of the slab was reduced from 0.7 to 0.37.

Effect of freezing on the fine structure of fish muscle. -- In fillets frozen from one side only, muscle cell damage caused by freezing was more complex than in fillets frozen from both sides. The

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 ABSTRACTER: Martin Heerdt

3.26 HEAT LEAKAGE INTO REFRIGERATED RAIL CARS

Hicks, E. W. (C.S.I.R.O., Division of Food Preservation, Homebush, N.S.W. (Australia))
International Congress of Refrigeration, Reports and Communications, 9th Congress, Section 7, pp. 312-317 (1955) (Paris, France)

1. Definition of heat leakage coefficients. --The rate of heat leakage into refrigerator cars is generally specified by giving the average values in Kcal/m^2hr.°C. or in Kcal/car hr.°C. The latter, which is measured directly, is used for practical calculations; the former immediately shows the efficiency of the insulating materials as installed.

In the specification of heat leakage coefficients, consideration should be given to the temperature difference chosen. Thus, the outside temperature chosen may be the average air temperature or the average car surface temperature. Since the effects of solar radiation can be large,it is generally best to use car surface temperatures under these circumstances. The inside temperature may be the average inner surface temperature, the average air temperature in the cargo space, the average cargo temperature, or the average air temperature in the flues. Since there is no single choice of temperature difference that is always satisfactory, it should always be specified in stating heat leakage coefficients.

2. Effect of solar radiation on heat leakage into refrigerator cars. -- Heat leakage into refrigerator cars due to solar radiation varies with the weather, the speed of the train, the amount and distribution of standing time, and is partly compensated by radiation to the sky at night. The magnitude of the effect may be conveniently expressed by the ratio:

$$\frac{\text{average difference in temperature between outside surface of car and air in cargo space}}{\text{average difference in temperature between outside air and air in cargo space}}$$

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 ABSTRACTER: Max Patashnik

DANISH FILLET MACHINE

FACTORS IN FREEZING

SAWDUST FROM FISH STICKS

REFRIGERATED RAIL CARS

3.234 (Cross Reference: 2.118)

concentration of deoxypentose nucleic acid (DNA), a cell constituent, in the expressible fluid obtained under standard conditions from cod fillets is a measure of this damage. Except for the DNA in the small amount of plasma that exudes from the ends of the cells at the cut surfaces, DNA does not ordinarily appear in the expressible fluid of unfrozen fillets because this fluid is intercellular. If fish are stored in ice for about 12 days, bacterial action will usually cause some of the muscle cells to break open. The cell contents then leak into interstitial spaces and DNA appears in the expressible fluid.

Freezing at sea. -- Tests with a six-station vertical "Torry-Hall" plate freezer for dressed cod have produced satisfactory results. The trawler Northern Wave is now being equipped on a commercial scale to use the Torry-Hall freezer at sea. Two six-station freezers will also be installed in the Torry Research Stations' new trawler, Sir William Hardy. Fish trade and consumer reaction to sea-frozen cod that was held 1 to 4 days in ice before being frozen was very favorable. Four-day iced and frozen fish was comparable to good quality fresh fish according to fish friers and smokers. No more than 3 days in ice before the fish is frozen is recommended as a standard which is intended to reduce variation in the quality of fish frozen at sea.

New cold stores. -- The new cold storage rooms at Torry Research Station have "jacket-cooling", which is the first installation of this type in the United Kingdom. Ten rooms each of 1000 cubic feet capacity are available at 7° to -40° F. and six rooms each of similar capacity are available at 32° F.

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This ratio is not an exact measure of radiation effects; its theoretical value in the absence of radiation will generally be between 0.96 and 0.99 depending on the efficiency of insulation and the train speed.

In a series of experiments, values between 0.99 and 1.67 were obtained. Based on these data, "increases in the heat flow into cars of 20 percent or more due to solar radiation can occur in Australia and the U.S.A. and no doubt elsewhere too."

3. Effects of air leakage. -- "The amount of air leakage depends upon the design of the vehicle and the condition of the door seals, drains and so on. Consequently the rates of air leakage will be variable.

A series of measurements, using CO_2, as a tracer gas in some New South Wales vehicles, indicated that a leakage rate of one change in five hours was typical." In carrying a chilled cargo during representative summer temperatures and humidities the heat input by air leakage at this rate was approximately 11 percent of the total heat input.

4. Direct measurement of heat leakage coefficient under operating condition. -- The procedure involves setting up some 20 to 30 thermocouples for temperature measurements and collecting and measuring the melted ice to determine the quantity of heat transferred (Q).

"Typical results obtained with Australian 40 ft. cars are heat leakage coefficients at 120 to 160 B.t.u./car hr.° F. or 54 to 73 Kcal/car hr.° C."

5. Use of heat leakage coefficients for design and performance calculations. -- With ordinary bunker and fan cars the use of the heat leakage coefficient as ordinarily defined and measured is usually straightforward. With solid stacks of frozen cargoes modifications in calculation must be made.

Heat leakage coefficients in roof-tank cars are more difficult and cannot be used to estimate ice consumption. In some roof tank car studies it was found: (a) heat leakage through the roof accounted for 40 percent of the ice melted, (b) with a cargo about 3° C. below its equilibrium temperature about 75 percent of the heat inflow was transferred to the ice, and 17 percent was transferred to the cargo.

2.3

the main principle was that 2 fish, having the same weight, need not necessarily have the same length, but they always have the same thickness of the backbone.

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bandsaw blades differing only in the one factor. All blades had the same gauge of 0.025 inch. The blades had a total set of 0.006, 0.014, and 0.022 inch resulting in an "effective thickness" of 0.031, 0.039, and 0.047 inch, respectively. The increase in degree of set caused a stepwise increase in the loss of sawdust from 7.82 percent to 8.69 percent.

The loss of sawdust that was incurred by a blade having a regular set was 8.23 percent, and the loss incurred by having every-tooth set was 8.20 percent. This small difference was not significant.

Effect of gauge. -- The effect of the gauge of the blade on the loss of sawdust was studied by the use of four bandsaw blades that differed only in thickness. The gauges studied were 0.020, 0.025, 0.028, and 0.032 inch. An increase in the thickness of the bandsaw blade caused a progressive increase of sawdust loss from 7.30 to 9.98 percent. Using a blade of minimum thickness therefore would reduce the loss of sawdust.

"Ideal" saw blade. -- After these factors had been considered, an "ideal" bandsaw blade was designed to decrease the loss of sawdust to a minimum. The blade that was chosen had the following characteristics: 3/8-inch in width, 6 teeth per inch, regular set, 0.020-inch gauge, and 0.007-inch degree of set. The loss of sawdust incurred by this blade was 7.21 percent less than that with the regularly used blade producing the least loss of sawdust and was 35.4 percent less than that with the regularly used blade producing the largest loss of sawdust.

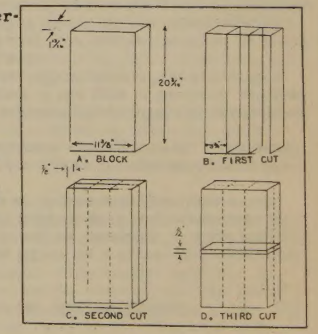

Fig. 1. - Steps in cutting fish sticks from fish blocks.

3.17 PRESERVATIVES - USE IN ICE

Partmann, W.
Kaltetechnik 7, No. 9, p. 270 (Sept. 1955) (Karlsruhe, W. Germany)
World Fisheries Abstracts 8, 29-30 (January-February 1957)

The infection of the fish muscle of whole fish takes place from the surface. By way of the myosepts of the connective tissue and the blood vessel system, deep and rapid infection is possible. Washing the fish before they are iced, even when using bactericidal agents, will lead to better quality only if more important factors, e.g., rapid cooling immediately after the fish are caught and disinfection of the surfaces of the holds are taken sufficiently into consideration. A thorough washing before filleting or further processing on land is desirable. By this washing process the slime on the skin can be removed without difficulty. In this way a reduction of bacterial counts--more than 80%--can be obtained. It can be further improved by adding bactericidal agents. Disinfection of processing tables and machines is recommended only if the fish are thoroughly washed before filleting. The keeping quality of fish fillets can be lengthened by dipping into solutions containing bactericidal agents. According to Canadian experiments, sodium nitrite and antibiotics were found suitable for this purpose. Use of chlorinated sea water for washing of whole fish or fish fillets has not given useful results. Small concentrations of free chlorine or hypochlorite ions are quickly inactivated by organic matter. With chlorine concentration greater than 8 mg. Cl/l., the skin of the treated fish is bleached. The use of chlorinated water for other disinfecting purposes in the fishing industries can be recommended. The reaction of chlorine with fish proteins and their derivatives, fish fats, vitamins, etc., requires further investigation. It is questionable if the transport of fish in chilled sea water with bactericidal agents will ever be of economical importance for the cheaper varieties of fish. This procedure, tried in Canada, may be suitable for the transport of high quality salmonides or flat fish, caught not too far from fishing ports.

Author's summary

3.337 CANNED FISH AND SHELLFISH PREFERENCES OF HOUSEHOLD CONSUMERS, 1956

Anonymous
Special Scientific Report: Fisheries No. 200, 328 pp. (February 1957) United States Department of the Interior, Fish and Wildlife Service, Washington 25, D. C.

The annual retail value of fish and shellfish sold to consumers in the United States is in excess of one billion dollars. The cost of merchandising these fishery products from producers to consumers runs into hundreds of millions of dollars annually. The present marketing study was undertaken to find ways of reducing the costs of marketing and of improving the marketing conditions for canned fishery products. It was financed by funds made available by the Saltonstall-Kennedy Act which made available a separate fund to promote the free flow of domestically produced fishery products in commerce.

The material covered by this survey is indicated by the table of contents.

Survey methods
- Sampling and estimation
- The questionnaire and field work
- Coding and tabulation controls

Summary of major findings
- The use of canned fish or shellfish and its relation to fresh and frozen fish or shellfish
- Frequency of serving canned fish or shellfish
- Variations by season

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ABSTRACTER: Kathryn L. Osterhaug

3.331 VOLATILE ACIDS, SUCCINIC ACID, AND HISTAMINE AS INDICES OF DECOMPOSITION IN TUNA

Hillig, Fred (Food and Drug Administration, Washington 25, D. C.)
Journal of the Association of Official Agricultural Chemists 39, 773-800 (August 15, 1956)

The purpose of this study was to gather data on the histamine, volatile acid number, and formic, acetic, propionic, butyric, and succinic acid composition of different grades of tuna ranging in quality from fresh to putrid. These products of decomposition do not always occur in every decomposed fish.

Materials for the spoilage study. -- Yellowfin and skipjack in good condition were obtained from high seas brine boats. Bluefin were caught in local waters off Terminal Island, California, and were out of the water 3 to 4 hours when received. Albacore used in packs 1 and 3 also were caught in local waters, whereas the albacore used in pack 2 was prepared from frozen Japanese tuna. In all of the tuna used in the spoilage study, the eyes were bright and the gills were deep red and without odor.

Classes of decomposition. -- To evaluate tuna quality, small samples of flesh were removed from incisions made 1 inch from the backbone along the back of each tuna. These flesh samples were obtained from front, middle, and tail portions. The organoleptic classification system used to evaluate tuna flesh was as follows: Class 0--no perceptible odor; class 1--an odor slightly off but only superficial in character (often described as fishy); class 2--a deep-seated odor barely perceptible that is somewhat repugnant (often described as stale); class 3--an odor similar to that of class 2 but of a readily noticeable intensity (often described as taint); class 4--an odor of greater intensity and decidely repugnant (often described as putrid).

Canning procedure. -- Some of the tuna obtained for the study were cooked and canned immediately

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ABSTRACTER: Martin Heerdt

3.4 SMOKE CURING AND DRYING (SMOKE CURING)

Anonymous
Report of the Food Investigation Board (Great Britain) for 1954, pp. 40-44 (1955)

Smoke curing. -- A new type of smoke generator in which combustion is controlled by heated air blown through a fluidized bed of sawdust is being remodeled. A chain-grate stoker-burner has been rated unsatisfactory because the burning front of the sawdust has proved impossible to stabilize. Smoke density in a small scale Torry smoke kiln is presently being servo-controlled within fairly close limits by regulating the air supply to the fire.

The amount of smoke from the particle phase that may be deposited in a given time on fish in a field-free space, has been greatly increased by charging the smoke particles in an intense electric field. Cross-sections of kippers viewed under ultra-violet light readily show the depth of penetration of the fluorescent constituents of wood smoke. This depth measurement, however, is only an approximation of the amount of smoking that has taken place. One of the bactericides in wood smoke has been identified as 1-0-methylpyrogallol, others being examined are believed to be 2:3-dihydroxy-5-methyl-anisole, and 2:3-dihydroxy-5-ethyl-anisole.

Drying. -- Air drying of cod fillets has been extended to cover the temperature range 50° to 212° F. As a result the relationship between the drying time-constant τ and the temperature θ can be determined more precisely. Where θ_o is a constant with the dimensions of temperature,

τ = constant X the expression, $[-\theta/\theta_o]$.

If adequate external heat is applied during vacuum freeze drying, the temperature of the undried

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ABSTRACTER: Martin Heerdt

ANTISEPTICS FOR FRESH FISH

INDICES OF SPOILED TUNA

MARKETING CANNED FISH

SMOKING AND DRYING

3.331 (Cross Reference: 2.00)

according to accepted methods of cleaning, oiling, salting, and heat processing. Tuna used for the two bluefin packs were class 0 at the start of the experiment, whereas for all of the other packs the tuna were class 1 at the start of the experiment. After the initial packs had been put up, all remaining tuna were stored in wire baskets stacked on a rack and allowed to stand on the cannery floor until decomposition occurred. All were examined daily for appearance and for the odor of small portions of the flesh that were removed as described previously. All tuna were washed daily with fresh water to remove slime and to retard dehydration. Then, as each organoleptic class was reached during progressive decomposition, several tuna were precooked and canned just as the initial tuna were canned.

Results. -- Canned tuna prepared from good quality fish normally contains a small quantity of chromatographically identifiable acetic acid. As decomposition progresses, acetic and formic acids increase steadily. With advanced decomposition, propionic and butyric acids may appear. Succinic acid and histamine also may be formed as tuna decompose. Individual volatile acids in canned tuna were found to be a good index of the stage of decomposition of the tuna flesh from which the canned tuna was prepared.

Some of the indices of decomposition are partially lost in the canning processes, but the loss never is great enough to enable canned decomposed tuna to be passed solely on the basis of its chemical analyses. Canning does not increase any of the indices of decomposition in passable tuna. More than one index of decomposition is needed to control all of the types of decomposition that occur during the spoilage of tuna.

3.4 (Cross Reference: 3.6)

portion of a fillet remains approximately within the limits of the critical temperature range 32° to 23° F. during the major part of the drying cycle. Within this range the initial sublimation rate is 0.015 grams per square centimeter per hour. Vacuum-dried fillets regain about 85 percent of their original wet weight. Characteristic browning occurs during the storage of freeze-dried as well as air-dried fish.

3.17

3.337

Preference among kinds of canned fishery products
Demand for unavailable items
Reasons people give for not using canned fishery products
Canned tuna - principal findings
Canned salmon - principal findings
Canned sardines - principal findings
Canned shrimp - principal findings
Use of canned pet foods containing fish in pet feeding
Brand interest

Tabulations of responses to questionnaire
Total use of canned fishery products
Use of canned tuna
Use of canned salmon
Use of canned sardines
Use of canned shrimp
Reasons for non-use of four major canned fishery products
Use of pet foods containing fish

3.234 FISHERY PRODUCTS, PHYSICAL PROPERTIES

Jason, A. C. and Long, R. A. K.
Proceedings of the IXth International Congress of Refrigeration 1, p. 2160 (1956) (Paris)
World Fisheries Abstracts 8, 23-24 (January-February 1957)

(a) This paper describes determinations of the thermal properties of fish muscle at the Torry Research Station, Aberdeen, Scotland.

The heat content of a small sample was determined over the range -40° to 20° C. (-40° to 68° F.) using an adiabatic calorimeter. Heating of the initially frozen specimen was achieved by arranging it in the form of a disc held between two copper discs, wired to a source of AC. The heating was uniform to ± 0.075° C. (± 0.135° F.). The shield temperature, automatically controlled by a differential thermocouple, followed the sample temperature within ± 0.1° C. (± 0.18° F.), thus reducing the heat gain of the sample to less than 15 joules per hour. ($^1/_{75}$ B.t.u./hr.).

The curve of "apparent specific heat" derived from the total heat content curve obtained in this way is reproduced along with curves obtained by calculation. The experimental and the calculated curves are of the same general form. Both show a latent heat effect at the sodium chloride/water eutectic not previously demonstrated. No attempt is made to explain the quantitative discrepancies between experimental and theoretical curves, but the persistance above the initial freezing point of high experimental values of "apparent specific heat" is noted and an attempt made to explain by analogy.

The thermal conductivity apparatus is of the steady-state line-source cylindrical-type with end guard lengths. The values of the thermal conductivity of water as determined in this apparatus were within 2% of the best published values.

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4.11 THE CHEMISTRY OF INCLUSION TYPE COMPLEXES

Schlenk, Hermann
Annual Report of the Hormel Institute 1955-56, pp. 66-71 (1956) (University of Minnesota)

Fractionation by means of inclusion dates back to 1940 when Bengen found that urea precipitates straight chain molecules preferentially from their mixture with branched chain molecules. Deoxycholic acid forms, with fatty acids, complexes of a type similar to those of urea with fatty acids. It was the objective of this investigation to extend the principal of fractional inclusion to the choleic acids. Next to the urea complexes, the choleic acids are known best. As a tool for fractionation, and unknown in its mode of action, the fractional formation of the choleic acids had to be developed and tested with mixtures of known composition.

It was demonstrated that deoxycholic acid conforms with urea and thiourea in its properties as a reagent for fractional precipitation of fatty acids from mixtures. Long chain and saturated acids are bound preferentially and fractionation of mixtures is possible. The experimental results were not encouraging for practical application. Practical use of the method requires recovery of fatty acids, and in order to be commercial, also of deoxycholic acid. As a preparative method, fractionation by means of deoxycholic acid is not promising.

The composition of the fatty acids or esters bound in choleic acids was found by paper chromatography of the complexes. The separation of fatty acids by papery chromatography are equally good whether applied as complexes or as free fatty acids, and quantitative analysis is feasible.

The separation of fatty acids having equal chain length but differing in unsaturation was demonstrated with model mixtures containing stearic and linoleic acids and with a C_{18} fraction of distilled

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ABSTRACTER: Edward H. Gruger, Jr.

4.11 IDENTIFICATION OF SOME MARINE OIL CONSTITUENTS BY CHROMATOGRAPHY

Sorrels, Frances M. and Reiser, Raymond (Texas Agricultural Experiment Station, College Station)
Journal of the American Oil Chemists' Society 34, 131-134 (March 1957)

Lipid constituents of menhaden and cod-liver oils, previously isolated into five fractions by column chromatography, were chromatographed using glass-fiber filter paper impregnated with salicic acid.

The following reference compounds were chromatographed on paper: winterized cottonseed oil (for triglycerides), vitamin A alcohol, vitamin A palmitate, 7-dehydrocholesterol, cholesterol, vitamin D_3, hexadecanol, cholesteryl palmitate, hexadecyl acetate, hexadecyl palmitate, d-α-tocopherol, d-α-tocopheryl acetate, and squalene.

The spots were sprayed with 50 percent v.v sulphuric acid and subsequently heated to char the lipids. Choline containing lipids were identified by Dragendorff's reagent and amino-lipid spots were reacted with ninhydrin.

The elutes from the column separations were collected in 20 to 50 ml. volumes, concentrated, and chromatographed by ascending technique on the salicic acid impregnated paper. The following solvent systems were used: cyclohexane, 1 percent methanol in cyclohexane, and 2 percent ethyl ether in iso-octane. Reference compounds were chromatographed simultaneously with the lipid fractions.

Since the R_f values of cholesterol and vitamin D_3 were similar in all solvents investigated, iodine was added to the ether-iso-octane system. This caused vitamin D_3 to remain at the point of origin while cholesterol moved to an R_f of 3.0.

A quantitative analysis of the spots was attempted by the use of both reflection and transmission densitometers. The transmission densitometer was modified by removing the lens and replacing the aperture discs with black tape to increase the aperture width to 7 to 8 mm. The spots from 5, 10, and 15 μg. quantities of fat were measured.

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ABSTRACTER: Donald C. Malins

4.63 UTILIZATION OF VITAMIN A ACTIVITY FROM ALFALFA OR FISH OIL BY CHICKS RECEIVING DIETS WITH AND WITHOUT DIPHENYL-P-PHENYLENEDIAMINE (DPPD)

Monson, W. J.; Gade, E. T.; Lloyd, M. D.; and Groschke, A. C. (The Borden Company, Elgin, Illinois)
Poultry Science 36, 166-170 (January 1957)

In this study the authors were concerned with the effect of the antioxidant (DPPD) on the utilization of vitamin A by the chick. Matterson et al. (1955) have reported that DPPD increases plasma vitamin A and liver storage of vitamin A in chicks on diets containing fish oil as the source of vitamin A. Potter et al. (1955) have reported that DPPD increased the vitamin A and carotenoid content of blood plasma and liver of chicks fed with a purified or a practical diet.

Experimental. -- Two experiments were included in this study. The first experiment made use of eight groups of day-old straight-run New Hampshire chicks, twenty chicks to the group. The second experiment made use of ten groups of day-old chicks in groups of 10 males and 10 females, which were the progeny of New Hampshire males crossed with Barred Rock females. Dams and sires of all chicks received an all mash breeder diet complete with the essential nutrients known to be required for hatchability including sources of unidentified factors. Chicks were watered and fed ad libitum on a basal diet deficient in vitamin A. Chicks were housed in steel batteries with raised wire floors.

Methods of analysis. --Livers were obtained from decapitated and bled chicks, kept separate as to sex, frozen, and stored in moisture proof containers until assayed. Liver samples were composited in a blender, and a two-gram aliquot was taken for vitamin A analysis by the method of Gade

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ABSTRACTER: Martin Heerdt

FISH FREEZING RATES

FISH OIL CHROMATOGRAPHY

CHEMISTRY OF FATS AND OILS

VITAMIN A ANTIOXIDANT

4.11

Of the five fractions obtained by column chromatography, the first three contained the lipids listed under reference compounds whereas the fourth is assumed to contain the fatty acids, and the fifth, the phospholipids. The first fraction contained vitamin A palmitate, cholesteryl palmitate, squalene, hexadecyl palmitate, and the tocopherols. All triglycerides came in the second fraction with a part of the aliphatic alcohol. The remainder of the latter appeared in fraction three with vitamin A alcohol, cholesterol, and vitamin D_3.

Phosphatidylethanolamine was the only phospholipid demonstrable in the oil samples investigated. Tests with Dragendorff's reagent for lecithin were negative. "Super D" cod-liver oil gave spots corresponding to triglycerides, vitamin D_3, vitamin A alcohol, phosphatidylethanolamine, and an unidentified constituent. Silmo cod-liver oil and menhaden oil chromatograms showed spots for squalene, triglycerides, vitamin A alcohol, vitamin D_3, and phosphatidylethanolamine.

Table 1. - R_f Values on Silicic Acid Impregnated Glass-Fiber Filter Paper of Lipides Found in Marine Oils

Compound	Cyclohexane	Cyclohexane-1% methanol	Isooctane-2%-ether
Winterized cottonseed oil[a]	0.00	0.89	0.65
Vitamin A alcohol	0.00	0.00	0.00
Vitamin A palmitate	0.00	0.87	0.46
7-Dehydrocholesterol	0.04	0.48	0.38[b]
Vitamin D_3	0.07	0.74	0.55
Cholesterol	0.08	0.69	0.44
Hexadecanol	0.16	0.64	0.65
Cholesteryl palmitate	0.63	0.93	0.90
Hexadecyl palmitate	0.61	0.91	0.93
Squalene	0.92	0.90	0.94
d-α-Tocopherol	0.42	0.91	0.79
d-α-Tocopheryl acetate	0.32	0.91	0.83

[a] Wesson Oil, Wesson Oil and Snowdrift Sales Company, New Orleans, La.

[b] In 2% ether in iso-octane, 7-dehydrocholesterol showed two R_f values, 0.00 and 0.38.

4.63

and Kadlec (1956). The blue color, which developed, was read on the Evelyn Colorimeter.

Results with experiment No. 1. --Seven graded levels of alfalfa ranging from 0.3 to 2.1 percent and one level of vitamin A oil were fed with and without 0.025 percent DPPD for four weeks. With this ration the highest level of alfalfa provided about 2,000 international units of the vitamin A per pound of diet. With only 0.3 percent alfalfa in the diet, DPPD caused a definite increase (maximum growth) in chick body weight; whereas maximum growth in chicks not receiving DPPD was obtained at the 0.6 percent level of alfalfa. Weights of livers from chicks receiving DPPD were heavier in every case except at the 0.6 percent level of alfalfa. Except in two cases the storage of vitamin A in livers of chicks receiving DPPD was at least 3 times greater than the storage of vitamin A in livers of chicks not receiving DPPD.

Results with experiment No. 2. -- The basal diet with added vitamin A was fed with and without five graded levels of DPPD ranging from 8 to 128 milligrams per pound and with and without 2,000 units of vitamin A per pound for 3 weeks. After this period all diets in chick groups 5 through 10 were changed to the basal diet (known vitamin A and known DPPD), whereas the diets of chick groups 3 and 4 remained unchanged and served as positive controls. The chicks in groups 1 and 2 had practically all died after four weeks on the vitamin A deficient diet.

Livers from 3-week-old male and female chicks from groups 5 through 10 when assayed for vitamin A did not show as large an increase in liver vitamin A owing to DPPD in the chicks' diet as did livers from chicks used in experiment 1 where preformed vitamin A was fed. All chicks that received DPPD had four to six times as much vitamin A in their livers as did chicks that did not receive DPPD. The minimum level of DPPD needed for maximum storage of vitamin A in the liver, therefore, is between 8 and 16 milligrams per pound of diet. In all of the groups there was a definite increase in survival due to DPPD. A direct correlation also existed between the liver storage of vitamin A at 3 weeks and the subsequent survival of chicks when DPPD was removed from their diet. Therefore, the chemically measured vitamin A that increased in the liver of chicks receiving DPPD is biologically active. The authors believe that DPPD exerts a vitamin A sparing effect via antioxidant activity in the feed, in the gut, and possibly in the tissue.

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Calculation of the thermal conductivity was attempted by assuming it equal to an NaCl solution of the same freezing point depression, using the published thermal constants of the constituents, according to well-known mixture laws. An allowance was made for protein and "bound water." The theoretical curve and experimental points show agreement.

(b) Theoretical analyses and experiments are described which show the considerable variation of thermal conductivity, density and apparent specific heat of fish muscle with temperature. The variation of these properties is found experimentally to introduce a number of interesting phenomena.

A preliminary investigation into the freezing of small packages of fillets by refrigerated air blast indicated: (1) the necessity for precision in thermocouple positioning and uniformity in heat transfer to obtain accurate thermal arrest measurements, (2) the effect of air speed, temperature and thickness of pack on thermal arrest time, (3) the effect of different conditions on evaporative weight losses, and (4) the edge effects obtained with small packages.

It had been found during this investigation that the initial loading temperature had a significant effect on the thermal arrest time. This phenomenon, whereby an increase in initial temperature affords a reduction in thermal arrest time, is studied in detail. The effect is so marked under certain conditions as to invalidate much experimental work for which initial temperatures were not recorded. The thermal arrest may be reduced by as much as one-half under identical plant operating conditions, and an attempt is made to explain this effect.

4.11

menhaden oil fatty esters. Quantitative paper chromatography was used to partly resolve the analytical and preparative difficulties.

An analytical investigation aimed at the highly unsaturated fatty acids in fish oils was carried out. A chain length analysis was necessary for the study. Approximately 600 grams of menhaden oil was hydrogenated and saponified. After removal of the unsaponifiables, the acids were esterified with methanol. Four hundred and ninety grams of the resulting methyl esters were distilled and the resulting fractions were chromatographically analysed.

No search was made for C_{24} and higher acid esters and no indication was found for a C_{12} fraction. According to the analyses (having limits of error of ± 1%), the chain length composition of menhaden oil fatty acids is C_{14}, 13.8 percent; C_{16}, 33.6 percent; C_{18}, 20.6 percent; C_{20}, 19.4 percent; C_{22}, 10.6 percent; and residues, (higher than C_{22} ?) 2 percent.

Analyses of intermediate fractions indicated the presence of C_{15} and C_{17} acids and methyl esters. Their isolation will be necessary for positive identification. The percentage of the new compounds is tentatively estimated to be 1 percent of the total fatty acids and is not considered in the above composition.

6.193 MEASUREMENT AND DIFFERENTIATION OF UNIDENTIFIED CHICK GROWTH FACTORS USING A NEW SEMI-PURIFIED RATION

Rasmussen, R. A.; Luthy, Paul W.; Van Lanen, J. M.; and Boruff, C. S. (Hiram Walker & Sons, Inc., Peoria, Illinois)
Poultry Science 36, 46-53 (January 1957)

Various unidentified growth factor carriers were fed as supplements to a purified basal chick diet, which was known to produce good chick growth. At least three different unidentified factors were apparent through the use of the basal diet.

Experimental. -- New Hampshire-Indian River cross chicks or Columbia crossbred chicks were used. These chicks came from dams that had been kept in individual-pen laying batteries with raised wire floors. The breeder diet contained animal protein as well as unidentified growth factor carriers because no advantage had been demonstrated in previous work by depleting the hens through feeding an all vegetable-protein diet. The basal diet was considered to be adequate in known nutritional essentials and designed for use in studies with unidentified growth factors required by the known-depleted chick. In addition, the basal diet permitted the separation of unidentified growth factors, which are indicated by increased growth responses when various combinations of unidentified growth factor carriers are fed at maximum response levels.

Chicks were maintained in batteries in a room thermostatically controlled at 90° F. for the first week, at 85° F. for the second week, and at 75° F. thereafter. Chicks received an unsupplemented ration for the first four days after which they were allotted to duplicate pens with 8 males and 8 females per pen and placed on supplemented rations. Additions to the basal ration were made by replacing Cerelose. Feed and water were provided ad libitum for the four-week experimental period. Chicks were weighed individually at the start and at the end of the second, third, and fourth weeks.

Results. -- The evidence obtained suggests that the three different unidentified factors essential for the rapid growth of chicks are: (1) a factor that is present in alfalfa meal and dried whey, (2) a

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 ABSTRACTER: Martin Heerdt

6.55 ACID ENSILAGE FROM COD AND HADDOCK OFFAL

Freeman, H. C. and Hoogland, P. L. (Technological Station, Halifax, Nova Scotia)
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 65, 24-26 (October 1956)

Introduction. -- Cod and haddock offal may be made into a valuable fisheries byproduct by treatment with lactic acid bacteria, sulfuric acid, or hydrochloric acid. The treatment converts the offal into an ensilage or silage which keeps indefinitely. After the addition of a neutralizer, the ensilage may be used in rations for chickens and hogs.

Objective. -- The technological station at Halifax has been studying the production of fish silage for more than a year. Various methods were tested, and a satisfactory procedure was finally adopted. This paper describes the procedure and reviews some of the properties of the product that is obtained.

Equipment. -- To prepare fish silage in batches of 800 to 900 pounds the following equipment is needed: one 90-gallon puncheon (a clean molasses puncheon is satisfactory), one wooden paddle (large enough to stir the contents of the puncheon), four 25-gallon wooden barrels thoroughly cleaned, one enamel pail (2½-gallon size), and one pyrex glass graduate for measuring liquids (32-ounce size).

Chemicals. -- Concentrated sulfuric acid (commercial grade), specific gravity 1.84 (95 to 96 percent) is needed to make fish silage. Commercial, ground limestone or ground chalk is needed to neutralize the acid in the silage before it is fed.

Procedure. -- After the puncheon has been soaked in water until it is water-tight, it is filled with 4 to 5 gallons of water and 200 to 300 pounds of fresh cod or haddock offal are added and mixed with the water. Five pounds of concentrated sulfuric acid is added from the glass graduate for each 100 pounds of offal used, and these ingredients are stirred with the wooden paddle. Care should be used to weigh or measure out the right amount of acid. The mixture is now allowed to stand for two or three days until the offal begins to disintegrate. An additional 200 to 300 pounds of offal and an

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 ABSTRACTER: Martin Heerdt

6.37 ALGAL CULTURE FROM LABORATORY TO PILOT PLANT

Burlew, John S.
Carnegie Institution of Washington Publication 600, Washington, D. C. (1953)

The Carnegie Institution's project on the mass culture of algae is an offshoot of its research on photosynthesis. In these investigations, particular attention was paid to the unicellular alga Chlorella pyrenoidosa because of the wide range of environmental conditions under which it can grow and because this organism has been used extensively in the study of photosynthesis.

In an investigation of the influence of environment on the chemical composition of chlorella, the conditions for varying the protein and fat content over wide ranges were established.

A small culture unit constructed and operated by Stanford Research Institute showed that continuous culture of chlorella was possible, but the results were not conclusive enough for the financing of further experimentation.

Further work of a fundamental sort was needed, and knowledge was desired as to whether any new problems would be introduced by a large increase in the size of the culture unit. To aid in this work, Arthur D. Little, Inc. set up a pilot plant for the culture of chlorella. Other institutions working on chlorella problems were the University of Texas and the University of Maryland.

Partial answers to the principal questions have now been obtained. The alga chlorella has been grown and harvested continuously on a large scale; it has nutritive value in animal feeding; possibly it or one of the other algae contains useful chemical raw materials; and estimates have been made as to the possible yields of chlorella in commercial quantities, based on the best data available.

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 ABSTRACTER: F. Bruce Sanford

7.89 DETERMINATION OF PRESERVATIVES IN THE FISH-INDUSTRY PRODUCTS II. DETERMINATION, DISTRIBUTION, AND RESIDUAL OF PRESERVATIVES IN FISH-INDUSTRY PRODUCTS

Hutshenreuter, R. (Inst. Fischverarbeit., Hamburg-Altona, Ger.)
Z. Lebensm. -Untersuch. u. -Forsch 104, 161-8 (1956)
Chemical Abstracts 51, 1498 (January 25, 1957)

A rapid method for detg. salicylic acid (I) is based on decompn. of org. material with H_3PO_4, evapn. of moisture, extn. of I with toluene, and detn. photometrically after reaction with $FeCl_3$. In treating salmon with an oil infusion of I, about 95% of the I is taken up by the fish flesh and only a small amt. of this is extractable with water. It is suggested that I combines with fish protein. In marinated fish over 90% of a small amt. of benzoic acid (II) added to the pickle is quickly taken up by the fish and remains there for 3 weeks, after which II decreases slightly in the fish and increases in the pickle. With addn. of hexamethylenetetramine (III) to marinated fish there is a distribution between liquor and fish and also an effect due to splitting of III to CH_2O and NH_3. In pure com. pickle liquors (contg. salt and vinegar) about 5% of added III split, yielding about 2.5 mg./100 g. of CH_2O. On addn. of protein (fish) the III continues to split until only 50-60% of that originally added can be detd. in exts. The detn. of III is based on recovering CH_2O. However, after digestion with pepsin 90-5% of the added III is evident from the CH_2O detn.

 ABSTRACTER: Reprinted in whole

GROWTH FACTOR MEASUREMENTS

ALGAL CULTURE

ENSILAGE FROM OFFAL

DETERMINATION OF PRESERVATIVES IN FISH PRODUCTS

6.37

The present 357-page book gives a fairly complete account of the work to 1953 and makes the accumulated experience conveniently available. This account is an aid to all the workers in the field and should help any organizations that may be interested in setting up pilot plants for the culture of algae.

Topics treated are as follows: Part I. Introduction and Summary; Part II. Conditions for Growth of Algae; Part III. Growth of Algae in Mass Culture; Part IV. Pilot-Plant Experiments; Part V. Possible Uses of Microscopic Algae.

The bibliography gives 297 references.

7.89

6.193

factor that is present in Wilson's liver residue and fish solubles, and (3) a factor that is present in distillers dried solubles. Fish solubles appear to contain only Wilson's liver residue factor, whereas each of the other unidentified factor carriers mentioned above appear to contain lesser amounts of the other factors in addition to its own. The unidentified factors in the various supplements were more fully apparent as promoters of growth when the productive energy of the basal ration was maintained at 1,077 Calories per pound.

Table 6. - Average chick responses with equicaloric and 41 Calories of productive energy per pound per percent protein. Parenthesis values are from table 5 for comparison.

Supplements to basal ration	Av. 4-week weights (gms.)			Feed/Weight gain		
	No fat added	Cal. P.E. equal	41 Cal. P.E. per lb. per % protein			
	(1)	(2)	(3)	(1)	(2)	(3)
None	386	386	386	2.5	2.5	2.5
10% DDS*	496	495	464	2.2	2.1	2.0
10% AW**	(497)	492	485	(2.5)	2.3	2.0
5% LR†	(508)	517	520	(2.2)	2.0	1.8
10% DDS + 10% AW	515	522	480	2.2	2.0	1.9
10% DDS + 5% LR	(542)	556	526	(2.1)	2.0	1.7
10% SW + 5% LR	(533)	542	480	(2.2)	1.9	1.8
10% DDS + 10% AW + 5% LR	558	578	331	2.1	1.8	--

* Distillers dried solubles
** 5% alfalfa meal and 5% dried whey
† Liver residue

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additional 5 pounds of sulfuric acid for each additional 100 pounds is now added every two to four days until the puncheon is filled. Each day until the offal is completely digested, the mixture is stirred with the wooden paddle. Complete digestion usually requires two to three weeks at room temperature or three to four weeks at about 50° F. When digestion is complete, the fish silage is filled into wooden barrels with the aid of the enamel pail and shipped or stored. In barrels at room temperature, the silage will keep for at least a year.

Composition. -- The acid silage assayed 20 to 26 percent or an average of 24.4 percent dry matter, 13 to 15.5 percent or an average of 14.5 percent protein (N x 6.25), and had a pH of 1.9 to 2.5 or pH 2.05 as an average. The vitamin content of an occasional batch showed 4 parts per million (p.p.m.), thiamine; 1 p.p.m., riboflavin; 20 p.p.m., niacin; 2 p.p.m., pantothenate; and 0.015 p.p.m., vitamin B_{12}.

Use of silage. -- The fish silage must be neutralized before use by the addition of ground limestone or chalk at the rate of 2½ pounds for every 100 pounds of silage. This should be added gradually with stirring. The neutralized product is very perishable and will spoil at room temperature in a few days. Only an amount needed for one or two days of feeding should be neutralized at a time. Chickens on a ration containing grains and neutralized silage without the addition of other animal protein grew very well. The maximum amount of silage that can be fed with the grain ration is 20 to 25 percent. Hogs on a ration containing 50 percent neutralized silage and no other ingredients of animal origin grew very well, but only 25 to 35 percent fish silage in the ration is recommended. The silage-containing ration must be discontinued two or three weeks before slaughter to avoid a fishy taste in the meat.

7.42 POLAROGRAPHIC DETERMINATION OF TIN IN FOODS

Markland, J. And Shenton, F. C. (County Analyst's Department, Shire Hall, Durham, England)
The Analyst (England) 82, 43-45 (January 1957)

Introduction. -- The routine determination of tin in canned foods can be made rapidly and accurately by polarography. It elminates the large samples and tedious separations of the gravimetric method, and the interference of oxygen in the volumetric and colorimetric methods. Results were found to be reproducible and accurate within ±3 percent. Lead interferes with the tin measurements but is not present in appreciable quantities in approved products. Complete removal of nitric acid is necessary, and this is accomplished by heating with ammonium oxalate.

Procedure. -- The entire content of a can is thoroughly mixed in a macerator. A 5-gram sample is boiled to low volume with 10 milliliters (ml) of concentrated nitric acid in a 300-ml Kjeldahl flask. The product is heated to incipient charring after the addition of 4 ml of concentrated sulfuric acid. Nitric acid is added dropwise to the boiling solution until digestion is complete. After boiling to the point that white fumes are evolved, the solution is cooled, treated with 10 ml of saturated ammonium oxalate solution, and again heated to fuming. The solution is transferred to a 50-ml calibrated flask, 1 ml of gelatin solution is added and the solution is adjusted to volume at 20° C. A portion of the solution is placed in the polarograph cell, de-aerated with nitrogen, and the polarogram read between −0.3 and −0.8 volt using a full compensation current. Under these conditions tin has a half-wave potential of about −0.5 volt. Determinations up to 400 parts per million are conveniently made using a Model B Mark II manual polarograph with 0.06 millimeter diameter capillary, a 2.9 second drop time, a 2.59-milligram per second mercury flow-rate, and a 30-centimeter mercury column height.

Results. -- Data reported in 3 tables show that a known added amount of tin was recovered from a

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ABSTRACTER: Claude Thurston

8.59 THE BILE ACID OF COD BILE

Dugal, L. C. and Laframboise, A. (Technological Station, Grande-Riviere, Quebec)
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 65, 21-23 (October 1956)

The possibility of recovering bile from the gall bladders of local cod was investigated from the standpoint of individual and average yields in an earlier article that appeared in issue No. 62 (1955) of this series of Progress Reports. Bile from cod gall-bladders now discarded as waste can be used to prepare pharmaceuticals; however, experimental evidence indicated that recovery is not economically practicable.

Purpose. -- This paper presents the results of a survey made to determine the variation in the concentration of the cholic acid found in samples of cod bile from individual gall-bladders and in samples of mixed cod biles. It is common knowledge that fish bile contains cholic acid and deoxycholic acid, both linked with taurine.

Experimental. --Cholic acid and deoxycholic acid were identified by paper chromatography. The concentration of these two acids was determined spectrophotometrically.

Results. -- Cholic acid concentrations found are shown in tables 1 and 2 (see over).

Discussion. -- Individual biles had an average concentration of 7.5 percent cholic acid, whereas group biles had an average concentration of 7.9 percent cholic acid. Records of the color of the bile were made because of the apparent existence of a relationship between color and cholic acid content. Cholic acid concentration was low in yellow colored bile, moderate in pale green bile, and high in dark green bile. The number of individual samples analyzed, however, was not adequate to verify the existance of a direct relationship between color and cholic acid content. Two mixed samples, each of which contained about 7 ounces of cod bile, were assayed for both cholic and deoxycholic acid. These samples contained respectively 3.5 and 5.5 percent cholic acid and 0.25 and 0.35 percent deoxycholic acid.

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ABSTRACTER: Martin Heerdt

7.85 FOOD EXAMINATION - FRESHNESS TESTS - MICROBIOLOGICAL

Wittfogel, H.
Die Fischwirtschaft 7, No. 11, p. 298 (November-1955) (Bremerhaven-F, W. Germany)
World Fisheries Abstracts 8, 45-46 (January-February 1957)

When using the method of direct microscopic bacteria count for estimating the freshness of fish, it is very important to select the most suitable parts of the fish muscle. Therefore, the distribution of bacteria in the muscle tissue of iced coal fish, codfish, haddock, red perch, and herring--stored until they have spoiled--has been investigated. The locations used for sampling are to be seen from Fig. 1 (see over). In a second series of tests, 3 samples were taken from the dorsal lateral muscle above the lateral line of 200 fish (Fig. 2). From tests with about 200 fishes in each of the 2 series, it was found that there is no regularity in the distribution of bacteria in the muscular tissue. These tests, therefore, cannot give any hints as to the position most suitable for taking samples. The average of the bacterial counts for the single fish species showed that generally the highest numbers in the dorsal lateral muscle were found at the end of the anterior third of the body. A comparison with the bacterial counts of the ventral muscle in the same pa t of the body (Fig. 3) showed that the values below the lateral line were higher than those above it. In 80% of the coal fish and codfish tested, and in 60% of the haddock, red perch and herring, the values below the side line were higher than those above the lateral line. Hence, it is suggested that for a direct microscopic count of bacteria in judging the freshness of fish, the sample should always be taken from the anterior third of the body below the side line.

See illustrations, over.

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ABSTRACTER: W. Partmann

8.59 FISH OILS VII. THE PIGMENTS OF PILCHARD OIL

Bailey, B. E. (Pacific Fisheries Experimental Station)
Journal of the Fisheries Research Board of Canada 4, 55-58 (April 1938)

The color of pilchard oil varies from golden yellow to dark brown, with occasionally a distinct greenish tint. Tompkins (1930) attributes the greenish color to the presence in the oil of chlorophyll from undigested plant material in the viscera of the fish. Biely and Chalmers (1936) feel that the yellow color of commercial pilchard oil is probably produced by fucoxanthin.

This paper presents a qualitative study of the pilchard oil pigments, and quantitative estimations of three pigment fractions in three samples of British Columbia commercial pilchard oil and in two samples of oil prepared from canned British Columbia pilchards.

Qualitative studies. -- The pigments were first separated by a chromatographic method which consisted of passing a solution of the pigmented material through a vertical column of a suitable adsorbent and eluting the different pigments separately by virtue of their different adsorption affinities. In the present investigation a well pigmented pilchard oil was dissolved in carbon disulphide and passed through a column of alumina. Part of the pigment was retained by the adsorbent, forming a dark orange-colored band at the top of the column; part of the pigment was not adsorbed, as the first liquid to come through had a yellow color. The column was then washed in turn by pure carbon disulphide, benzene, petroleum ether containing 1 percent absolute alcohol and finally by petroleum ether containing 10 percent absolute alcohol. The column was then free of pigment.

According to the description given by Palmer (1922), it appeared that the pigment which came through in carbon disulphide might be carotene; whereas the pigment eluted by petroleum ether

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ABSTRACTER: Kathryn L. Osterhaug

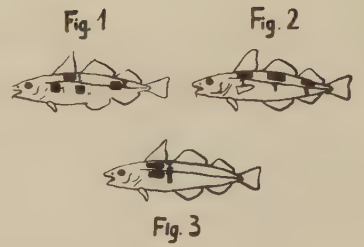
DETERMINATION OF TIN

BACTERIOLOGY OF FISH

COD BILE ACIDS

PILCHARD OIL PIGMENTS

7.85



8.59 (Cross Reference: 1.24, 4.11)

containing 1 percent alcohol, and the first pigment eluted by petroleum ether containing 10 percent alcohol appeared to be xanthophylls. Heilbron and Gillam (1937) pointed out that, of the more important carotenoids, fucoxanthin is generally the most firmly adsorbed, therefore it is probable that the orange pigment finally eluted may be fucoxanthin.

Quantitative studies. -- Quantitative separations of the carotene, xanthophyll and fucoxanthin in five samples of pilchard oil were made by partition between immiscible solvents. The results are presented in the following table:

Sample	Carotene mg. per 100 g. oil	Xanthophyll mg. per 100 g. oil	Fucoxanthin mg. per 100 g. oil
1935 commercial pilchard oil	0.06	0.49	0.16
1936 commercial pilchard oil--A	0.17	0.66	0.48
1936 commercial pilchard oil--B	0.25	0.84	0.84
Oil from canned pilchards--A	0.02	0.61	0.00
Oil from canned pilchards--B	0.13	0.64	0.00

7.42 (Cross Reference: 7.74)

variety of samples to the extent of 97 to 103 percent with two exceptions which reached 106 percent. Comparison with volumetric determinations gave nearly identical values.

8.59 (Cross Reference: 6.72)

Table 1. --Percentage cholic acid in biles from individual cod bladders.

Color of bile	Weight of bile in bladder	Cholic acid
	ounce	%
Pale green	0.69	5.0
Medium green	0.39	9.6
Dark green	0.076	7.8
Dark green	0.50	9.0
Pale yellow	0.14	1.74*

* Bladder almost white, with very thick wall, and contained very little bile.

Table 2. --Percentage cholic acid in mixed cod bile samples.

Bile color	Number of bladders in lot	Total weight of bile	Cholic acid
		ounces	%
Very pale yellow	8	0.33	3.0
Pale green	5	0.29	5.5
Medium green	3	0.49	7.8
Medium green	4	0.44	6.6
Dark green	2	0.63	9.8
Dark green	2	0.41	9.1
Very dark green	10	1.44	7.7
Very dark green	5	1.16	9.7
. . . . .	. .	7.0	5.5
. . . . .	. .	7.0	3.5

0.32 PAPER-ELECTROPHORETIC STUDIES OF STRUCTURE PROTEINS EXTRACTED FROM FISH MUSCLE

Nikkila, O. E. and Linko, R. R.
Suomen Kem. B29, 47-53 (1955) (In English)
Food Science Abstracts 28, 463 (October 1956)

A method is described for the analysis of fish muscle proteins by paper electrophoresis. Extracts of pike muscle, obtained at ionic strength 1.0, and pH 5 to 6, and submitted to electrophoresis in a phosphate sodium chloride buffer of ionic strength 0.35, and pH 7.5, gave a diagram with 6 peaks, indicating the presence of a small, quick-moving component, 2 larger components, and a slow-moving group with 3 peaks.

0.32 COMBINATION OF FISH ACTOMYOSIN WITH ANIONIC AND CATIONIC DYES

Migita, Masao and Otake, Shigeo
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 4, 260-264 (1956) (English synopsis, figures, and tables)

0.38 STUDIES ON THE CRYSTALLINE STYLE OF MOLLUSCS IV. AMYLOLYTIC ENZYME (PART 2)

Hashimoto, Yoshiro and Kijima, Shizumasa
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 3, 172-175 (1956) (In English)

To more thoroughly elucidate the nature of an amylase enzyme a tripartite analysis of corn starch hydrolyzates was made that demonstrated a peculiarity in the mode of starch degradation.

0.38 THE ISOLATION FROM COD LIVER OF A NUCLEOTIDE RELATED TO ADENYLOSUCCINIC ACID

Storey, I. D. E. and Love, D. N. (Department of Surgery, University of Edinburgh, Scotland)
The Biochemical Journal 64, 53P (December 1956)

While attempting to isolate uridine-diphosphate-glucuronic acid from boiled cod liver extracts, we have obtained by barium fractionation and paper chromatography a nucleotide resembling adenylosuccinate in many respects. The nucleotide contains one molecular proportion of ribose and of total phosphate when the molar extinction coefficient of Carter & Cohen (1955) is used. Acid-labile phosphate is absent.

1.81 MECHANICAL HANDLING OF OYSTERS

Anonymous
Food Processing 17, 26-27 (October 1956)

(Abstract of this article appears under 2.2 page 7 - January 1957)

1.81 BLEEDING AND HEAT DEATH IN THE SOUTHERN OYSTER

Fingerman, Milton and Fairbanks, Laurence D.
Commercial Fisheries Review 18, 4-5 (October 1956)

(Abstract of this article appears under 2.2 page 7 - April 1957)

1.81 CORRELATION OF pH AND QUALITY OF SHUCKED SOUTHERN OYSTERS

Gardner, E. A. and Watts, B. M.
Commercial Fisheries Review 18, 8-15 (November 1956)

(Abstract of this article appears under 8.8 page 23 - May 1957)

1.85 PRESERVING SHRIMP QUALITY AND BEAUTY

Fieger, E. A.; Novak, A. F.; Bailey, M. E.; McConnell, J. N.; and Viosca, P., Jr.
Southern Fisherman Year Book for 1956, 16, 21-23, 81, 82 (November 30, 1956)

(Abstract of this article appears under 3.12 page 9 - May 1957)

1.85 OBJECTIVE TESTS APPLICABLE TO QUALITY STUDIES OF ICE STORED SHRIMP

Bailey, M. E.; Fieger, E. A.; and Novak, A. F.
Food Research 21, 611-620 (November-December 1956)

(Abstract of this article appears under 2.19 page 5 - May 1957)

1.85 CHEMICAL ICES FOR SHRIMP PRESERVATION

Fieger, E. A.; Bailey, M. E.; and Novak, A. F.
Food Technology 10, 578-583 (December 1956)

(Abstract of this article appears under 3.12 page 9 - May 1957)

2.02 STUDIES ON THE BIOCHEMICAL CHANGE IN THE FISH MUSCLE

Saito, Kaname and Hidaka, Tomio
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 9, 1025-1028, No. 10, 1082-1085 (1956) (English summary, figures, and tables)

V. On the post-mortem changes in myosin fraction-N, ATP, free SH group, and ATPase activity of carp muscle.
VI. On the changes in amount of myosin fraction-N, ATP, free SH group, and ATPase activity of carp muscle by treatment of freezing and thawing.

2.02 STUDIES ON THE ORGANIC PHOSPHATES IN MUSCLE OF AQUATIC ANIMALS. III. EFFECTS OF STORING TEMPERATURE UPON THE ADENOSINE POLYPHOSPHATE CONTENT OF CARP MUSCLE

Saito, Tsuneyuki and Arai, Ken-ichi
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 9, 569-573 (1956) (English abstract, figures, and table)

Post-mortem changes in adenosine polyphosphate content occurring in carp muscle, which had been stored at various temperatures (16° C., 0° C., -8° C., liquid air), were studied by ion exchange chromatography.

2.113 ZINC ANODES FOR USE IN SEA WATER

Crennell, J. T. and Wheeler, W. C. G.
Journal of Applied Chemistry 6, 415-421 (October 1956)

Laboratory investigations of the failure of zinc anodes in sea water have shown that the presence of iron in excess of a few parts per million is the cause.

2.113 CATHODIC PROTECTION OF IRON

Van Wyk, J. D. N. (National Physical Laboratory, South African Council for Scientific and Industrial Research, Pretoria)
Nature 178, 1245-1248 (December 1, 1956)

2.114 ON THE LINE-HAULER WITH TORQUE CONVERTER

Kusama, Hidetoshi; Yamaguchi, Yoshio; and Miyazaki, Yoshio
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 9, 975-977 (1956)

The authors measured the shock absorbing characteristics and speed control of a line-hauler with a torque converter.

2.118 THE CHILLING AND FREEZING OF FISH

MacCallum, W. A.
Canadian Fisherman 43, 6-10 (March 1956)

(Abstract of this article appears under 2.15 page 5 - December 1956)

2.118 REFRIGERATION OF FISH - PART 4 - PREPARATION, FREEZING, AND COLD STORAGE OF FISH, SHELLFISH, AND PRECOOKED FISHERY PRODUCTS

Dassow, John A.; Pottinger, S. R.; and Holston, John
Fishery Leaflet 430 (1956) United States Department of the Interior, Fish and Wildlife Service, Washington 25, D. C.

(Abstract of this article appears under 3.23 page 9 - January 1957)

2.1475 MODEL EXPERIMENTS ON THE SARDINE PURSE SEINE OPERATING IN HYUGANADA IV.

Iitaka, Yunosuke
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 7, 389-392 (1956) (English abstract and figures)

A series of model experiments was made with the purpose of investigating the timely change of the depth of bottom margin of the net in the course of operation.

2.3 REFRIGERATION OF FISH - PART 2 - HANDLING FRESH FISH

Butler, Charles; Dassow, John A.; Carlson, C. J.; Carver, Joseph; and Heerdt, Martin
Fishery Leaflet 428, pp. 1-84 (1956) United States Department of the Interior, Fish and Wildlife Service, Washington 25, D. C.

(Abstract of this article appears under 3.23 page 11 - May 1957)

2.3 TECHNICAL NOTE NO. 35 - IMPROVED WORKMEN'S STAND FOR PROCESSING PLANTS

Sanford, F. Bruce (United States Fish and Wildlife Service, Seattle, Washington)
Commercial Fisheries Review 18, 28-29 (December 1956)

This is a photographic report showing the details of construction and the method of employing a lift-up standing grate, which has proved both convenient to use and easy to clean.

2.03 TRANSPORT AND STORAGE OF FISH IN REFRIGERATED SEA WATER: IV. PRELIMINARY REPORT ON NITROGEN LOSS, WEIGHT CHANGES, AND PROTEOLYSIS (BELLY-BURN)

Barker, R. and Idler, D. R.
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 104, 16-18 (November 1955)

(Abstract of this article appears under 2.15 page 7 - October 1956)

2.6 BOSTON FISHERIES COOPERATIVE FORMED ON FISH PIER

Anonymous
Fishing Gazette 73, 196 (April 1956)

(Abstract of this article appears under 9.4 page 19 - December 1956)

2.8 (Cross Reference: 1.81)

CLASSES IN CLASSIC CUISINE - OYSTERS

Diat, Louis
Gourmet 17, 22, 28-31 (January 1957)

2.8 HOW TO COOK CRABS

Robey, Dorothy M. and Kerr, Rose G.
Test Kitchen Series No. 10, 14 pp. (1956) United States Department of the Interior, Fish and Wildlife Service, Washington 25, D. C.

For sale by the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C., price 20 cents.

2.9 VITAMIN CONTENT OF FRESH, PROCESSED SHRIMP

Novak, A. F.; Fieger, E. A.; and Bailey, M. E.
Quick Frozen Foods 18, 64-65 (July 1956)

(Abstract of this article appears under 1.85 page 5 - June 1957)

2.9 MEASUREMENT OF THE NET UTILIZATION OF HEAT-PROCESSED PROTEINS BY MEANS OF THE PEPSIN DIGEST-RESIDUE (PDR) AMINO ACID INDEX

Sheffner, A. Leonard; Adachi, Richard; and Spector, Harry
Journal of Nutrition 60, 507-516 (December 10, 1956)

(Abstract of this article appears under 0.7 page 3 - June 1957)

2.9 ACTION OF BENZOIC ACID AND QUININE ON "VENERUPIN" A SHELLFISH POISON

Migita, Masao; Kanna, Koichi; and Isino, Ayako
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 7, 424-428 (1956) (English synopsis and tables)

An unsuccessful attempt was made to purify "Venerupin", a poison found in shortneck clam and oyster in Lake Hamana, by using benzoic acid or quinine as an adsorbent.

3.12 HOW NEWLY OK'D ANTIBIOTIC BOOSTS POULTRY SHELF-LIFE

Wrenshall, C. L. and McMahan, J. R.
Food Engineering 28, 53-56 (December 1956)

Approval of the Food and Drug Administration has been given for use of a second broad-spectrum antibiotic-oxytetracycline, for poultry processing. Refrigerated whole poultry have a shelf-life 50 to 100 percent longer after being chilled in an ice bath containing special oxytetracycline product. Tests show this agent can also extend shelf-life of fresh meats, fish, and vegetables.

3.12 PRESERVING UNPEELED SHRIMP

Toulmin, Harry A., Jr. (Commonwealth Engineering Co. of Ohio)
U. S. 2,758,929 (August 14, 1956)
Chemical Abstracts 50, 17251 (November 25, 1956)

Unpeeled, freshly netted shrimp are stored in an aq. dispersion of dextran. E.G., the dextrans are produced bacterially by inoculating a nutrient medium (pH 6.5-7.5) with Leuconostoc mesenteroides and incubating the culture for 12-48 hrs. or until a max. yield of dextran is obtained. The pH of the fermented product is adjusted to 7.0-8.0 with $CaCl_2$. The dextran is pptd. with acetone or alc. and dried. The so-called "native" dextran has a very high mol. wt. and may be used directly by dispersing it in an aq. medium, or it may be hydrolyzed by acids or enzymes to a product of lower mol. wt. before dispersing.

3.238 THE "WORKING PACKAGE" AND CONVENIENCE FOODS

Anonymous
Modern Packaging, Encyclopedia Issue for 1957, 30, 16-18 (November 1956)

3.238 CHECK POINTS FOR PACKAGE PLANNING

Anonymous
Modern Packaging Encyclopedia Issue for 1957, 30, (between pp. 46 and 47) (November 1956)

3.238 A SIMPLE APPARATUS FOR DETERMINING GAS PERMEABILITY OF FLEXIBLE FILMS

Henderson, R. and Wallace, G. A.
Food Technology 34, 636-638 (December 1956)

A simple, inexpensive apparatus for determining the gas permeability of flexible packaging films has been designed. Data are given to show the reproducibility and confidence limits of the method for both high and low permeability films. The ration of the permeabilities of Saran, Mylar and polyethylene were found equivalent to those published by other investigators. It is a simple tool for rating the relative permeabilities of flexible films.

LIST OF PUBLICATIONS REGULARLY ABSTRACTED

Analyst
Analytical Chemistry
Archives of Biochemistry and Biophysics
Biochemical Journal
Bulletin of the Faculty of Fisheries, Hokkaido University
Bulletin of the Japanese Society of Scientific Fisheries
California Fish and Game
Canadian Fisherman
Canadian Journal of Chemistry
Canadian Journal of Technology
Canner and Freezer
Chemical Abstracts
Chemical and Engineering News
Chemical Engineering
Chemical Processing
Chemistry and Industry
Commercial Fisheries Review
Drug and Cosmetic Industry
FAO Fisheries Bulletin
Federation Proceedings
Feed Bag
Feedstuffs
Fisheries Newsletter (Australia)
Fish. Res. Bd. Can., Prog. Repts. Atlantic Coast Stas.
Fish. Res. Bd. Can., Prog. Repts. Pacific Coast Stas.
Fishing Gazette
Food Engineering
Food Manufacture
Food Packer
Food Preservation Quarterly
Food Processing
Food Research
Food Science Abstracts
Food Technology
Frosted Food Field
Gourmet
Industrial and Engineering Chemistry
Industrial Refrigeration
Institutions
Journal of Agricultural and Food Chemistry
Journal of Applied Chemistry
Journal of Biological Chemistry
Journal of Nutrition
Journal of Organic Chemistry
Journal of the American Chemical Society
Journal of the American Dietetic Association
Journal of the American Oil Chemists' Society
Journal of the Association of Official Agricultural Chemists
Journal of the Chemical Society (London)
Journal of the Fisheries Research Board of Canada
Journal of the Science of Food and Agriculture
Maine Coast Fisherman
Modern Packaging
Modern Refrigeration
National Fisherman
National Provisioner
Nature
Nutrition Reviews
Pacific Fisherman
Pan American Fisherman
Poultry Science
Practical Home Economics
Progressive Fish-Culturist
Quick Frozen Foods
Refrigerating Engineering
Report of the Food Investigation Board (Great Britain)
Science
Southern Fisherman
Trade News (Fisheries Department, Canada)
Western Fisheries
World Fisheries Abstracts
World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above listed publications are included. Biological papers are generally omitted.

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Editorial Clerk (Typist)--Gladys K. Chandler

3.33 AUTOMATION AND THE KITCHEN

Gould, Wilbur A.
Food Packer 37, 36, 48 (May 1956)

(Abstract of this article appears under 0.12 page 1 - January 1957)

3.33 HEAT PROCESSING OF BEEF. PART VIII. STERILIZING EFFECTS OF HIGH TEMPERATURE PROCESSES

Hurwicz, H.; Gardner, B. W., Jr.; and Tischer, R. G. (Iowa State College, Ames, Iowa
Food Research 21, 282-294 (May-June 1956)

3.33 STRUVITE IN CANNED PRODUCTS

Fujii, Hisashi and Yamada, Haruo (Japan Marine Products Co., Odawara)
Repts. Japan Marine Products Co. Research Lab. No. 7, 31-38(1956)
Chemical Abstracts 50, 12330-12331 (September 10, 1956)

I. Determination of struvite in canned crabs.- After mild digestion of crab meat with protease, CCl_4 or NaI was added and the crystals were sepd. by centrifugation.
II. Comparison of struvite under different conditions of treatment.--The following effects on the yield of crystals of struvite were investigated: (1) freshness of crab meat, (2) sea water when used in boiling and cooling, (3) methods used in cooling the canned products, and (4) treatment of the meat with acid. More crystals were found with fresher meat.

4.15 LIPIDES IN NORTHERN PIKE

Wilber, Charles G. (St. Louis Univ., St. Louis, Mo.)
Trans. Am. Fisheries Soc. 84, 150-4 (1954)
Chemical Abstracts 50, 10935 (August 10, 1956)

The mean value for lipides in the blood of 10 northern pike (Esox lucius) caught in Lake Minchumina, Alaska, in mg./100 ml. were: total fatty acids 771; sterols 183; phospholipides, 411. The mean values for lipides in the fresh liver were: total fatty acids 9.1; sterols 0.89; and phospholipides 3.1 percent.

4.15 THE ISOLATION OF ISO- AND (+) -ANTEISO- FATTY ACIDS OF THE C_{15} AND C_{17} SERIES FROM SHARK (GALEORHINUS AUSTRALIS MACLEAY) LIVER OIL

Morice, Isobel M. and Shorland, F. B. (Fats Research Laboratory, Department of Scientific and Industrial Research, Wellington, New Zealand)
The Biochemical Journal 64, 461-464 (November 1956)

The liver oil of the New Zealand school shark (Galeorhinus australis Macleay) has been shown to contain traces (0.1-0.2%) of 13-methyltetradecanoic, (+)-12-methyltetradecanoic, 15-methylhexadecanoic and (+) -14-methylhexadecanoic acids.

4.19 TURTLE OIL

Aval, N.
Rev. franc. corps gras 3, 105-7 (1956)
Chemical Abstracts 50, 6749 (May 10, 1956)

Properties and characteristic nos. are given of the oil obtained from muscles and genital organs of Chelonia athecae. Its use in dermatology is based principally on its quality of facilitating the penetration of incorporated vitamins, hormones, etc., into the tissues of the skin, and its astringent power.

4.19 STUDIES ON THE SEA ANEMONE GYROSTOMA SP. LIPIDS OF GYROSTOMA SP.

Rajagopal, M. V. and Sohonie, Kamala (Department of Biochemistry, Institute of Science, Bombay, India)
The Biochemical Journal 65, 34-36 (January 1957)

The concentrations of cerebrosides, free and total cholesterol, total phospholipid, lecithin and sphingomyelin have been determined in the whole anemone, Gyrostoma sp., as well as in its mesenteries, gonads, and tentacles.

4.63 ANTIOXIDANTS PRESENT STATUS

Couch, J. R.
Feedstuffs 28, 32-34 (May 19, 1956)

(Abstract of this article appears under 4.60 page 17 - January 1957)

4.64 THE ANTIOXIDANT PROPERTIES OF SPICES IN FOODS

Chipault, J. R.; Mizuno, G. R.; and Lundberg, W. O. (The Hormel Institute, University of Minnesota, Austin)
Food Technology 10, 209-211 (May 1956)

Allspice, cloves, sage, oregano, rosemary, and thyme increased the stability of all the fat substrates in which they were tested, but the relative effectiveness of the spices varied with the different substrates. Sage and rosemary have previously been found to be much more effective than the other spices in lard alone. Cloves were a powerful antioxidant in simple oil-water emulsions and in ground pork. Oregano was most effective in mayonnaise and French dressing.

4.64 USE OF ANTIOXIDANT IN PAPERBOARD

Doyle, M. E.; Sullivan, R. D.; and Booth, H. G.
Modern Packaging 29, 119-123, 195 (July 1956)

(Abstract of this article appears under 3.238 page 13 - February 1957)

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4.91 THE HYDROGENATION OF DIETARY UNSATURATED FATTY ACIDS BY THE RUMINANT

Reiser, Raymond and Reddy, H. G. Ramakrishna (Texas Agricultural and Mechanical College System, College Station)
The Journal of the American Oil Chemists' Society 33, 155-156 (April 1956)

Goats were fed alfalfa meal containing 10 percent cottonseed or linseed oil. After 11 weeks the fatty acids of rumen, stomach, and caecum contents were compared to those of the feed.
It was found that the high levels of linoleic and linolenic acids of the feed were reduced to very low levels in the rumen, with comparable increases in the saturated acids.

4.92 A COMPARATIVE STUDY OF THE NUTRITIVE VALUE OF THERMALLY OXIDIZED OILS

Johnson, Ogden C.; Sakuragi, Taketami; and Kummerow, Fred A. (Department of Food Technology, University of Illinois, Urbana)
The Journal of the American Oil Chemists' Society 33, 433-435 (October 1956)

Thermal oxidation of corn oil under laboratory conditions, at 200° C., led to the formation of an oil exhibiting definite growth-depressing action under both ad libitum and paired feeding conditions. It appeared that the products formed during the thermal treatment were related to the unsaturated or polyunsaturated portions of the oil.

5.7 STUDIES ON ENCEPHALOMALACIA IN THE CHICK. 5. THE EFFECT OF FISH OIL AND DIPHENYL-P-PHENYLENEDIAMINE ON THE VITAMIN E METABOLISM OF THE CHICK

Bunnell, R. H.; Matterson, L. D.; Singsen, E. P.; and Eaton, H. D.
Poultry Science 35, 436-451 (March 1956)

(Abstract of this article appears under 4.99 page 11 - December 1956)

6.23 PROCESSING OF WHALE-LIVER OIL WITH LIQUID AMMONIA. I. I. EXTRACTION WITH LIQUID AMMONIA AND ITS REACTION

Itai, Ichiro
Repts. Research Lab. Nippon Suisan Co., Tokyo) 7, 102-7 (1956)
Chemical Abstracts 50, 9040 (June 25, 1956)

6.61 FATTY-ACID HALIDE REACTION PRODUCTS WITH PROTEINS

Keil, Havard L. (Armour & Co.)
U. S. 2,728,759 (Dec. 27, 1955)
Chemical Abstracts 50, 7485 (May 25, 1956)

6.135 A STUDY OF THE ODOR PROBLEM IN FISH OILS

Chipault, J. R.
Annual Report of the Hormel Institute 1955-56, pp. 61-65 (1956)

(Abstract of this article appears under 4.21 page 15 - March 1957)

6.135 ON THE DEODORIZATION OF THE MARINE ANIMAL OILS

Tanimura, S.
J. Shimonoseki Coll. Fish. 5, 159-169 (1955) (Summary in English)
Food Science Abstracts 28, 396 (August 1956)

Tables record the acid value, iodine value, specific gravity, refractive index, viscosity at 30° and 50° C., color, and solubility in Wijs solution, of the refined, polymerized, and hydrogenated oils of mackerel, herring, hoshizame, sardines, and whales. Polymerization of marine oils was found to occur rapidly at 250° C. to 300° C., and most of the highly unsaturated acids, which constitute the major components of the oils, were transformed into less highly unsaturated fatty acids. This procedure, followed by hydrogenation, in the presence of catalysts, such as reduced nickel, Raney nickel, activated carbon, or activated clay, was found to be a means of deodorizing them. Raney nickel gave satisfactory results with all the oils, and reduced nickel with herring and whale oils.

7.593 COLORIMETRIC DETERMINATION OF HISTAMINE

Baraud, Jacques and Genevois, Louis (Fac. sci., Bordeaux)
Bull. soc. chim. France, 681-3 (1956)
Chemical Abstracts 50, 9486 (July 10, 1956)

7.593 ISOLATION AND IDENTIFICATION OF NITROGENOUS COMPONENTS IN MEAT

Alexander, J. C. and Elvehjem, C. A.
Journal of Agricultural and Food Chemistry 4, 708-711 (August 1956)

(Abstract of this article appears under 7.522 page 21 - March 1957)

7.593 STUDIES OF MUSCLE OF AQUATIC ANIMALS. XXIV. THE DETERMINATION OF BETAINE NITROGEN

Shimidu, Wataru and Endo, Kinji
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 7, 413-416 (1956) (English abstract, tables, and figures)

Betaine in muscle extractives is precipitated with ammonium reineckate at pH 1, and converted with $AgNO_3$ into betaine nitrate which can be titrated with alkali.

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